FLIGHT & The AIRCRAFT ENGINEER.

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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CONTENTS.

NOTICE OF REMOVAL.
The Offices—Editorial and Advertisement—of "FLIGHT and The Aircraft Engineer" are now at
36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.
Telephone No.: Gerrard 1828.
Teleg. Address: "Truditur, Westcent, London."

EDITORIAL COMMENT.

"Newspapers are an essential part of our war organisation."— (*Sir Auckland Geddes, Minister of National Service.*)

So far as the merits of the case concerned with the strike of aeroplane operatives in Coventry go, we do not propose to discuss them—assuming that there are any merits, one way or the other. It is quite possible that the men, on the one hand, had some sort of grievance, and it is equally possible that the employers might have conceded something more than they did in order to avert a stoppage of work. That is to say, there may have been faults on both sides, which a little more tact on either part might have smoothed away. However, as we have said, there is no need to discuss the matter from any angle of view but one, and that is the appalling effect produced by the intensely unpatriotic action of the men in ceasing work on account of what was, after all, a mere bagatelle. We have seen the shameful spectacle of over fifty thousand workmen, engaged upon the most vital work connected with the war, loafing about the streets of Coventry, putting in their time with football and games, while their fellows in the trenches have been dying in hundreds to keep their homes and lives safe. Really, it is difficult to preserve even a semblance of patience when writing on the subject.

The Coventry Strike.

If there is the least sense of shame or compunction existing among the late strikers, they must now, and will increasingly in the future, feel an absolute horror and loathing of their ill-judged action. Here we are, at the most critical stage of a war in which our whole existence is at stake and in which the final result of victory or defeat is agreed to hang upon our ability to establish a definite superiority in the air. And that is precisely the time chosen to bring about a totally vexatious stoppage of work in the aeroplane engine industry! There can be but two alternative explanations. The one is the general wrong-headedness with which a section of labour appears to regard the questions which turn upon the relations between masters and men, and which has been at the root of a great deal of recent industrial trouble. The other alternative is a much more unpleasant one, and one which we should hesitate without the most definite proof to ascribe to any community of British workmen—though under all the circumstances the Coventry strikers can only blame themselves if the charge were hinted at. We refer to the movement which has become known as Boloism. We do not for a moment believe that the mass of the men who came out on strike could have thought or believed that they were directly helping the enemy, but again we say that there is no one to blame but themselves if the thought should occur to those outside the influence of the strike that there may quite possibly have been some hidden influences at work, directly emanating from enemy quarters. However, the strike has now fortunately been brought to a conclusion, and no useful end can be served by recriminations. We can only trust that the men have gone back to work imbued with a proper sense of their wicked action in retarding the production of vital supplies and determined to work the harder to overtake the shortage.

National Factory *v.* Private Enterprise.

Dame Rumour is again busy with the alleged intention of the Ministry of Munitions to nationalise the aircraft industry. From all we hear, the intention seems to be present, especially in the light of what is taking place around us. More and more works of private constructors of aircraft are being brought under what may best be described as "Khaki control." Now, if the intention were to militarise essential industries for the purposes of the war and to prevent strikes by bringing the workers under the Army Act, we could understand, even if we did not approve, the action of the Ministry. But that does not seem to be the intention. On the contrary, the objects may be described as purely civilian, if the term may properly be applied in the case of an industry concerned at the moment entirely with the war. Or, perhaps, it would be more correct to call the underlying motives more bureaucratic than military.

The subject is one that we have discussed at considerable length on more than one occasion in the past, so we do not intend to recapitulate all the arguments we have used against the creation of a great national factory at the expense of the private industry. At the moment the necessity seems to be for a thorough realisation of the trend of the movement which is undoubtedly going on, and for the preparation of measures to counteract it. It is of no avail for the industry to play the game of "wait and see." The danger is a present and insidiously growing one. It seems to us that the position is that the bureaucracy of the Ministry of Munitions is beginning the fight for its own existence which will have to be seriously reckoned with, not only in the case of that one Department, but in those of all the new Ministries and Departments which the war has brought into being. We have here a huge organisation, absolutely essential for the purposes of the war, but whose usefulness will cease entirely on the conclusion of peace unless it can find another job for itself. It has an enormous staff of thousands of temporary officials, who have tasted to the full of the joys of Government employment, and who manifestly will not allow themselves to be thrown out into a cold, hard world, without a desperate fight for "cushiness" when the war ends. Now there is only one department of our war activities which looks like remaining as a permanency, and that is the aerial arm. The building of warships will probably be cut down to an irreducible minimum once the war is over. The making of guns will almost cease, because we shall have reserves enough to carry us through all the little "police wars" we are likely to find on our hands for the next half century. The huge shell-making and filling factories will close down with the cessation of the demand for ammunition. So with every one of the direct war industries, with the sole exception of that of building aircraft and the manufacture of aircraft supplies. It is quite clear, then, that here is the one and only hope for the bureaucrats of the Ministry of Munitions to save their official existence, and hence the gradual process of "peaceful penetration" which is undoubtedly in progress. We confess we view that process with the most profound disquiet, the more so as there does not seem to be any present remedy for it. Under that wonderful measure the Defence of the Realm Act, assisted by its sister the Munitions of War Act, the mere manufacturer is absolutely helpless. He is as clay in the hands of the potter. Nothing can save the situation except the creation of a strong volume of public opinion against the gradual absorption of the industry and the creation of the great national aeroplane factory which is clearly the aim of the Ministry. On every ground the intention is unsound. It is not as though the private constructor had failed to rise to the great occasion, and that the work could be done better now or in the future under direct Government auspices. On the contrary, everyone who knows the comparative records of the R.A.F. and the private builders is aware that the facts are all the other way. The whole question is, as we have pointed out, bound up in the fight for life of a bureaucracy which is only tolerable for the period of the war, but which we hope to see entirely abolished at its end. Our experience of its methods does not beget a feeling of love for it—so much so, that the feeling of war weariness which undoubtedly does exist among a section of the people has its genesis more in the bureaucratic infliction to which we have been subjected than in the actual sacrifices that have been called for by the war itself.

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Another Aircraft Strike.

In the *Times* of Monday last there appeared the following letter from Mr. Charles Marston, Managing Director of Sunbeams, Ltd. :—

"Referring to your leading article in the *Times* of to-day, on March 9th, under the heading of 'A Trade Union Scandal,' I pointed out in your columns that the sheet-metal workers of the Midlands, unlike other trade unions, had not had their labour diluted, and that they were also exempted from military service. The industry employs both skilled, semi-skilled, and unskilled men; the lightness and simplicity of the work, which consists principally of soft soldering, makes the trade peculiarly suited for the employment of women.

"Despite my letter in March last, little appears to have been done by the authorities to insist upon this union bearing its fair share of war conditions as the other unions in the engineering trade have done. In consequence of this indulgence, the semi-skilled and unskilled sheet-metal workers, dissatisfied with the large wages that the skilled men on aeroplane work were receiving, have brought about a general strike.

"On October 30th last, in an endeavour to avert this calamity, the sheet-metal employers, under pressure from representatives of the Ministry of Munitions, the Air Board, and the Admiralty, agreed to further considerable increases in wages. The minimum wage for unskilled sheet-metal workers was actually fixed, including bonuses, at 55*s.* 6*d.* per week, and piecework prices were to bear at least 25 per cent. advantage on the day rate. Any further differences were to go to arbitration. It must be borne in mind that the aeroplane workers' wages are much higher than the above, and that this rate was for the simplest class of work. Differences arose regarding the interpretation of the advances as affecting certain piecework prices. Contrary to the agreement just concluded, the union leaders refused arbitration on the prices in dispute, but offered to accept the decision of Mr. John Murray, one of the leading officials of the Ministry of Munitions, who had negotiated these very favourable terms on their behalf.

"A meeting was held in London on Tuesday last. Mr. Murray decided in favour of the employers' interpretation of the agreement, and Sir George Askwith, who was present, approved his decision. Thereupon the whole union have gone out on strike, and the aeroplane output is held up.

"If the semi-skilled and unskilled workers, who are causing all this trouble, had long ago been replaced by women, as have similarly graded men in other unions, this dispute could never have arisen. It is now only fair to the patriotic trade unions, who have had their labour diluted, and whose wages are far lower than the unskilled section of the sheet-metal workers, that this state of affairs should case. The present strike is an excellent opportunity for the Government to put the Sheet-Metal Union on the same footing as the other trade unions, who are giving their patriotic support to the war."

We have quoted this letter in its entirety because

WINTER FLYING.—On a Martinsyde at Hanworth.

it seems to shed a great deal of light on the methods of the Government in dealing with the labour situation, and, secondly, accepting Mr. Marston's statements as reflecting the facts on the attitude of a fortunately small section of the trade unions which is absolutely unable to see any further than its own immediate interests. Here is a clear case for the dilution of labour, as we pointed out last March when the original dispute referred to by Mr. Marston was at its height. Everyone but the Union was agreed upon that, and yet there has been no insistence upon such a process of dilution as was demonstrated to be necessary. On the other hand, as in the case of the Coventry strike, we have a body of workers engaged upon tasks essential to the conduct of the war which takes no account of the vital need of urging forward aircraft production or of the lives of those who are fighting its battles at the Front. All it cares for is its own comparatively insignificant "interests," and in addition displays an utter lack of morality in that it will not accept the decisions of the arbitrator to whom it had agreed to submit its case. Really, there are no words in which to adequately describe the state of mind which apparently is responsible for these dire happenings at a time of crisis.

We are the deadly enemies of bureaucracy. We are jealous of every jot and tittle of the freedom won for us by our forebears, and we regard with profound disquiet the battle that will inevitably be attendant on the regaining of the liberties that have been taken from us by the Defence of the Realm Act and other war measures. But for all that there is, we recognise, one cardinal end that must be attained, if we sacrifice in the task every one of our few remaining liberties and privileges, and that is the defeat of the Germans. We should regard it as a deplorable thing if the necessity arose for militarising the industries directly or indirectly connected with the output of munitions of war, but we had rather see that happen than that we should lose the war. In all seriousness we warn the leaders of labour who are responsible for these strikes and stoppages of work that this is what will inevitably happen if they are not careful. And when it does happen labour will find that public opinion—or that portion of public opinion which really counts—will have been entirely alienated and will be solidly behind the Government in any action it deems fit to take. Doubtless, the reply of the labour section concerned will be that to attempt to militarise essential industries would result in an industrial revolution. Well, we must take our chances of that. In any case, better to lose the war after having made a supreme effort to win it than to lose it by default.

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The Danger of Over Standardisation.

We are glad to hear that the Air Board has addressed a communication to the Aircraft Production Board of the United States on the subject of the danger arising out of over-standardisation of aircraft, a subject to which attention has frequently been directed in these pages. As to the usefulness of standardisation within limits there can be no two opinions, but it is quite possible for the keenness for output to work to our great disadvantage. In considering the problems attending the construction of aircraft, we have to keep it well before us that the design of to-day is likely to be rendered hopelessly obsolete by that of to-morrow, and it is thus folly of the worst description to put all our eggs into the one basket. We are not implying that that is the policy which is being pursued in America, but we do think there is a danger that our Allies' enthusiasm for manufacturing efficiency and huge outputs might tend to lead them a little astray. Evidently this view is shared to some extent by our own authorities, and hence the warning which is said to have been given. No undue importance need be attached to the fact that the Air Board has thought it necessary to give America what may really be called a friendly tip. There is certainly no divergence of opinion between us and our Allies regarding the future of the war in the air. All that has happened is that a little advice, born of our greater experience of war, has been tendered by the one and accepted by the other in a spirit of absolute friendship.

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The Need of Better Co-ordination.

It becomes increasingly apparent that so far from our methods of achieving the maximum possible output of aircraft and other essentials of war having progressed as they should, there still remains a deplorable amount of waste of effort. In other words, the want of a proper system of co-ordinating manufacture does not appear to have deeply penetrated the minds of those whose business it is to secure that maximum which is agreed to be essential for the gaining of a speedy victory. We still muddle along, dissipating our efforts more or less aimlessly instead of striving and studying how every factory, every machine can best be turned to account in the common task. We have not arrived, if we may put it so, at standardisation of methods. Instead of treating aircraft production as a whole and regarding each separate factory engaged in its several branches as being departments of a single organisation, we appear to look upon them as entirely distinct establishments—as each being a sort of water-tight compartment, so to say.

In this way, for example. Take the manufacture of aeroplane tanks as a case in point. Six hundred of these are perhaps required of a single type. The contracts for their manufacture are divided up in the proportion of two hundred, a hundred and fifty, a hundred, and three lots of fifty each. Now, that means six separate sets of patterns to be made and as many sets of jigs, and until these have been made none of the work can really progress. Obviously, if each of the six contractors were given a single part to make, the process of preparing to manufacture would be simplified by exactly five-sixths; a considerable saving of time would result; the work of inspection would be reduced to a minimum; and far greater all-round efficiency would result. It is a matter for the new Air Council to concern itself about and to put in order, and is one that we commend to the new Air Minister for his consideration.

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The King and Queen at Hendon.

The following appeared in the *Court Circular* of December 4th:—

"Their Majesties, attended by the Countess Fortescue, Major Reginald Seymour and the Earl of Cromer, visited the Integral Propeller Co. at Hendon, and were received by Mr. Howard Voigt, managing director.

"The King and Queen afterwards proceeded to the Grahame-White Aviation Company, where they were received by Mr. Claude Grahame-White, chairman and managing director. Major C. S. Paulet, representing the Ministry of Munitions, was also in attendance."

FLIGHT

HONOURS.

Honours for the R.N.A.S.

IT was announced in the *London Gazette* of November 30th that the King has been pleased to approve of the award of the following honours, decorations and medals to officers and men for services in action with enemy submarines :—

Bar to the Distinguished Service Cross.

Flight Lieut. B. D. HOBBS, D.S.O., D.S.C., R.N.A.S.

Second Bar to the Distinguished Service Cross.

Flight Sub-Lieut. (now Flight Lieut.) F. L. DICKEY, D.S.C., R.N.A.S.

Distinguished Service Medal.

Air-Mech., 1st Gr., J. A. MORTIMER, O.N. F11344 ; Air-Mech., 2nd Gr., E. M. NICOL, O.N. F18942.

The King has been pleased to approve of the award of the following honours and decorations to officers of the R.N.A.S. :—

Distinguished Service Order.

Wing Commander C. LL. COURTNEY, R.N.A.S.—In recognition of his services in command of a wing of the R.N.A.S. at Dunkirk. Squadrons attached to his wing have invariably shown a high standard of efficiency, and the success of the fighting squadrons generally is largely due to his knowledge and initiative.

Observer Lieut. R. W. GOW, D.S.C., R.N.A.S.—For conspicuous gallantry and devotion to duty in carrying out a photographic reconnaissance of the Belgian coast under difficult conditions on October 15th, 1917. Obs. Lieut. Gow has also carried out a large amount of valuable spotting work for H.M. monitors, both by day and night, including the successful operations against Zeebrugge on May 12th, 1917, and against Ostend on June 5th, 1917.

Distinguished Service Cross.

Acting Flight Commander F. C. ARMSTRONG, R.N.A.S.—In recognition of his services with a wing of the R.N.A.S. at Dunkirk between February and September, 1917. He has destroyed several hostile machines, and has led his flight with very great skill and gallantry.

Flight Lieut. H. F. BEAMISH, R.N.A.S.—In recognition of his services with a wing of the R.N.A.S. at Dunkirk between January and September, 1917, during which time he has destroyed several hostile machines and driven down numerous others.

Flight Sub-Lieut. (now Flight Lieut.) E. T. HAYNE, R.N.A.S.—In recognition of his services with a wing of the R.N.A.S. at Dunkirk between March and September, 1917. He has had numerous engagements with enemy aircraft, and on August 16th, 1917, attached an enemy aerodrome and placed a whole flight of machines out of action by machine gun fire. During a flight of over two hours, during which time he attacked transport and railways, he never exceeded a height of 1,000 ft.

Flight Sub-Lieut. G. W. HEMMING, R.N.A.S.—In recognition of his services with a wing of the R.N.A.S. at Dunkirk between March and September, 1917, during which period he has been continuously employed on the Belgian coast, and on many occasions has been in charge of a flight. On September 22nd, 1917, he led his flight against a formation of 20 enemy aircraft, and, engaging three consecutively, brought them all down.

Flight Sub-Lieut. J. E. L. HUNTER, R.N.A.S.—In recognition of his services with a wing of the R.N.A.S. at Dunkirk between July and September, 1917, during which time he has carried out continuous work on offensive patrols. On September 22nd, 1917, he destroyed two enemy aircraft which were attempting to interfere with our spotting machines.

Bar to the Distinguished Service Cross.

Acting Flight Commander R. P. MINIFIE, D.S.C., R.N.A.S.—For conspicuous gallantry in air fighting throughout October, 1917, during which period he has destroyed several enemy machines and driven down others out of control.

Mentioned in Despatches.

The following officer has been mentioned in despatches :—
Lieut. H. O. FRY, R.N.V.R.

Mentioned in Despatches.

IN the despatch from Lieut.-General G. F. Milne, commanding in chief, Salonica Force, giving a long list of names brought to the notice of the Secretary of State for War for gallant conduct and distinguished services rendered during the past six months, the following are included :—

Royal Naval Air Service.

Flight Lieut. E. S. BOYNTON ; Flight Lieut. E. T. BRADLEY ; Flight Lieut. E. P. HICKS ; Flight Lieut. G. A. MAGOR ; Flight Lieut. G. MOORE ; Flight Sub-Lieut. W. H. RICHARDSON ; Capt. F. R. SCARLETT, R.N. (Wing Capt., R.N.A.S.) ; Wing Commander J. R. W. SMYTH PIGOT, D.S.O.

Royal Flying Corps.

Temp. Lieut. J. L. BAMFORD, Gen. List (killed) ; Lieut. (temp. Capt.) W. D. M. BELL, M.C., Spec. Res. ; Lieut. D. EASDALE, Spec. Res. ; Lieut. P. M. L. EDMUNDS, Lrs. ; Lieut. H. J. GIBSON, Spec. Res. ; Lieut. A. G. GOULDING, M.C., Can. Inf. ; Temp. Lieut. (temp. Capt.) G. W. M. GREEN, D.S.O., M.C., Gen. List ; Lieut. (temp. Maj.) J. H. HERRING, D.S.O., M.C., Spec. Res. ; Lieut. A. KNIGHT, N. Lan. R. ; Lieut. (temp. Capt.) W. R. B. MCBAIN, R.F.A. ; Lieut. (temp. Capt.) J. Y. MCLEAN, R.F.A. ; Temp. 2nd Lieut. (temp. Capt.) S. A. MELLER, Gen. List. ; Lieut. (temp. Maj.), F. F. MINCHIN, M.C., Spec. Res. ; Capt. O. I. PRESTON, Notts and Derby R. ; Temp. Lieut. H. J. SCALES, Gen. List ; Lieut. (temp. Capt.) F. H. SONGHURST, Spec. Res. ; Temp. 2nd Lieut. (temp. Lieut.) W. SUTHERLAND, Gen. List ; Temp. Lieut. R. M. WYNNE-EYTON, Gen. List. ; 5755 Flight Sergt. J. W. AIREY ; 7876 1st Cl. Air-Mech. W. H. S. ANDREWS ; 36764 Cpl. H. FRITH ; 2371 Sergt. W. C. HOLDING ; 2468 Sergt. F. LOVELACE ; 25268 Cpl. J. A. WARD ; 25407 Cpl. J. L. YOUNG.

AIR FIGHTING IN NOVEMBER.

"THREE hundred and seventy British, French, and German aeroplanes were reported down on the Western front during November," says the *Times* in its excellent monthly summary. "This number includes 52 accounted for in the last days of October, but not officially notified till the beginning of last month—1 by the British and 51 by the French. Deducting these, the number actually brought down in November is reduced to 318, which compares with 399 in the preceding month. Of the 318, the British claim 108, the French 84, and the Germans 126.

"According to the reports of General Headquarters in France, 65 aeroplanes failed to return to their aerodromes. At least 20 of these were lost, not in combat with enemy airmen, but partly through causes beyond the control of the pilots, as when many were caught in a sudden mist while they were well east of our line, and partly because of our airmen's 'audacity' and readiness to take risks in flying at exceptionally low altitudes in order, as at Passchendaele and before Cambrai, to aid the attacking infantry.

"The British successes include those achieved by the R.N.A.S. during their raids on enemy bases in Belgium and their offensive patrols along the Belgian Coast. And, as in October, their record is a very fine one, for they destroyed 9 enemy machines, drove 8 down out of control, and 1 damaged—18 in all—without themselves losing a single aeroplane. On the battle-front, 44 German machines were destroyed, 8 fell to anti-aircraft or rifle fire, and 38 were driven down completely out of control.

"Most of the enemy machines reported last month as being lost to the French were accounted for during the Battle of Malmaison. In that battle French airmen engaged in over 600 fights, during which they crashed 16 German machines and drove down 50 others, the majority of which, it is officially declared, were completely destroyed. The heaviest individual day's fighting was, apparently, on November 8th, on the British front, when our pilots and gunners brought or drove down out of control 20 German aeroplanes and we lost 9 machines.

"So far as the German Air Service is concerned, the most interesting item during the month was the reappearance in the reports of Main Headquarters of the name of Capt. Richthofen, the leader of the squadron or 'circus' which bears his name, after an absence therefrom of over two months. This airman is now credited with 62 victories."

THE 230 H.P. BENZ AERO ENGINE.

Bore, 145 mm. Stroke, 190 mm.

THE following detailed description of the 230 h.p. Benz engines is based on information courteously placed at our disposal by officials of the Air Board. Being of a far more detailed nature than any particulars that have hitherto been published relating to German aero engines, this description will be read with interest by all concerned in aero engine design and construction.

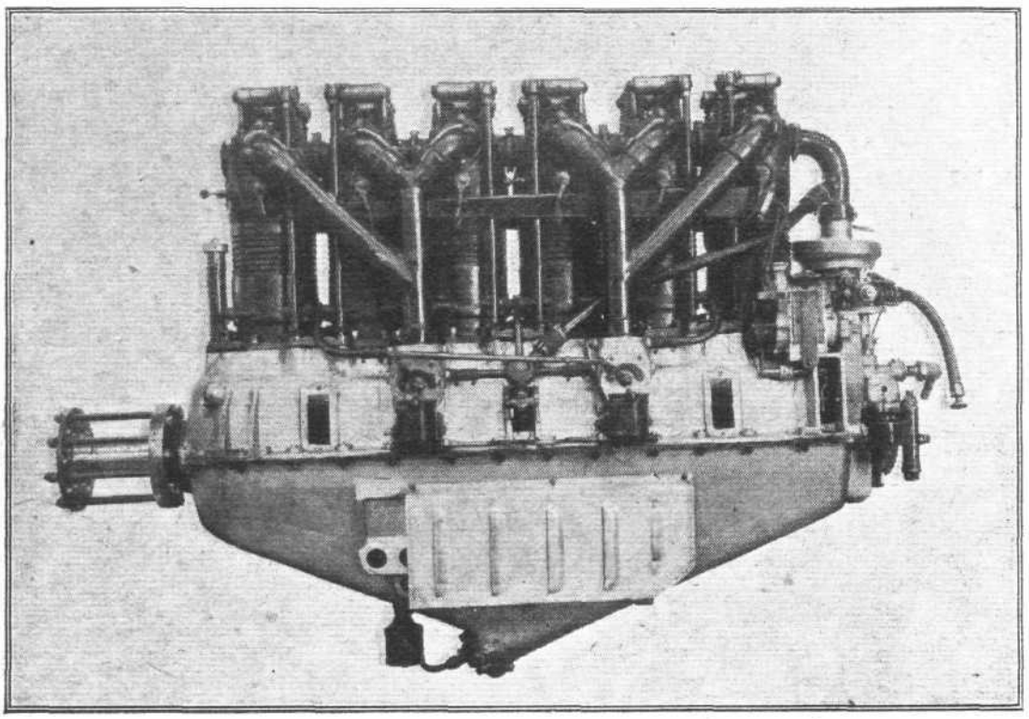


Fig. 1.—Induction side of engine.

Leading Features of the Engine.

Following the usual German aero engine practice, the 230 h.p. Benz is of the six-cylinder vertical water-cooled type. Each separate cylinder is bolted to the crankcase by long bolts and studs, which pass through the crank chamber top half and secure the crankshaft bearings between the top and bottom halves of the crank chamber.

Two inlet and two exhaust valves are fitted in the head of each cylinder. The valves are operated by overhead valve rockers working on ball-bearings and by push rods on either side of the cylinders. The two camshafts, which run on plain bearings, are neatly arranged inside the top half of the crankcase, and the floating exhaust camshaft is provided with half-compression cams.

The pistons are of cast iron, fitted with three exceptionally wide rings, and the piston heads, following

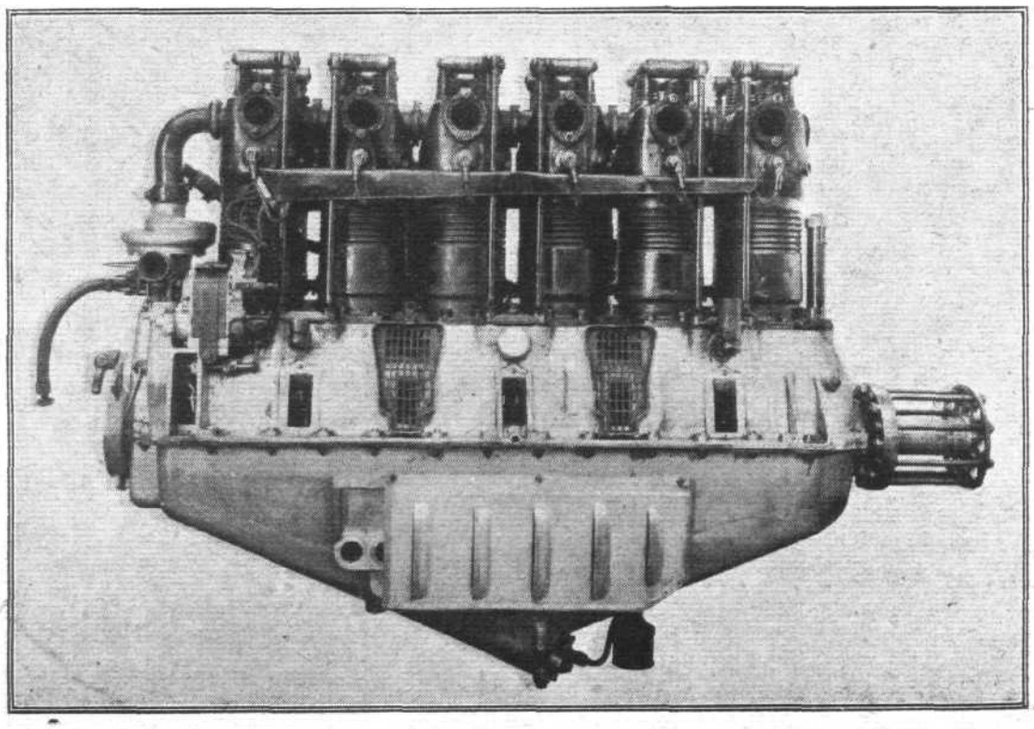


Fig. 2.—Exhaust side of engine.

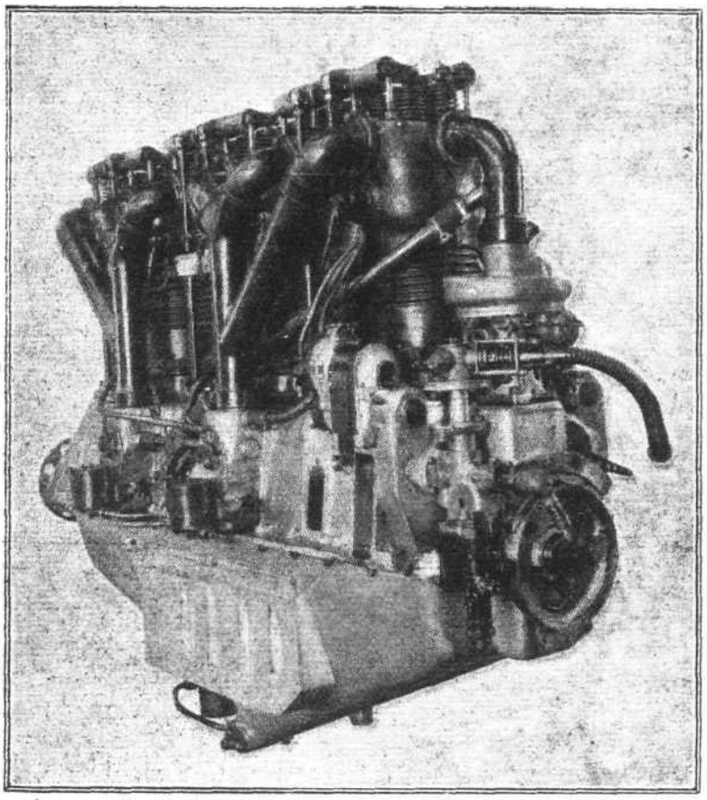


Fig. 3.—Rear end view of engine showing petrol pump driven off end of inlet camshaft.

An oil-sealed petrol pump of interesting design supplies petrol to the carburettors in conjunction with a supplementary pressure reservoir enclosed in the main petrol tank. The petrol pump is driven off the rear end of the inlet camshaft. The same driving spindle also

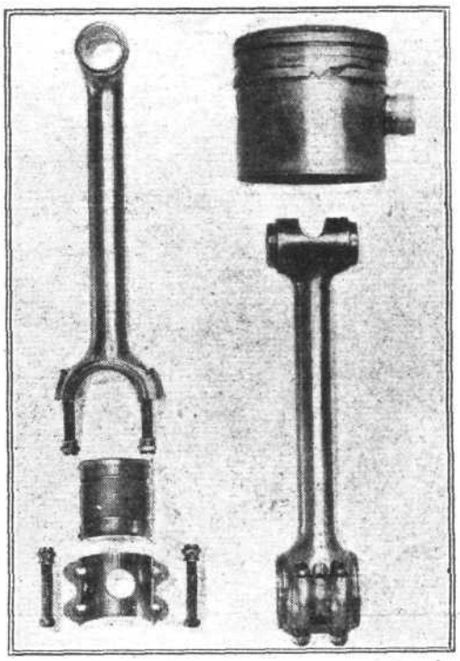


Fig. 4.—View of piston and connecting rod.

usual Benz practice, are supported by conical steel forgings riveted and welded to the piston crown, which bear on the centre portion of the gudgeon pins, through slots cut in the connecting-rod small ends.

As in the 160 h.p. Benz engines, two separate two-jet carburettors are fitted, each having their air in-take passages through the top half of the crankcase casting. Each carburettor supplies three cylinders through an independent branched induction pipe, built up of light aluminium tube.

The lubrication of the crankshaft and connecting-rod bearings is effected by a very neatly designed gear pump working in an auxiliary oil reservoir formed in the bottom of the air-cooled base chamber.

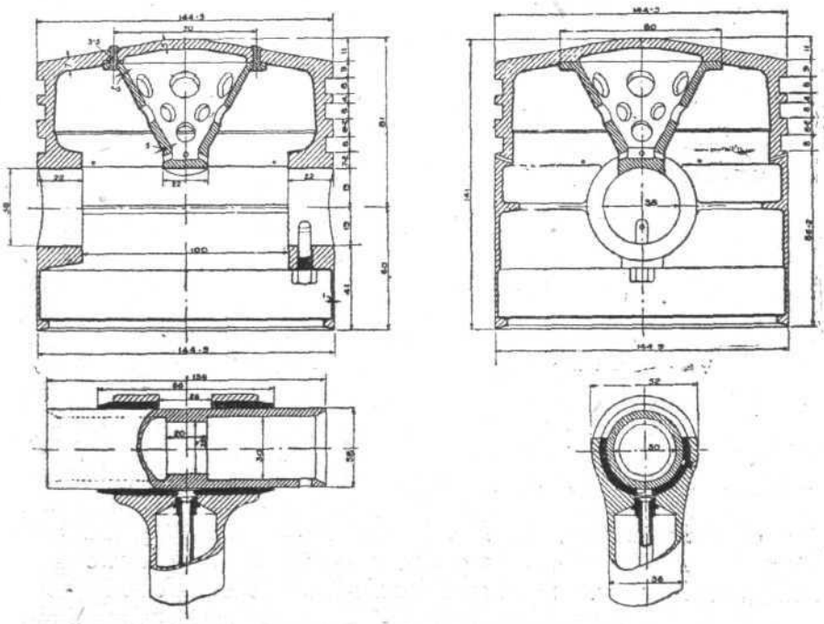


Fig. 5.—Details of piston and gudgeon-pin.

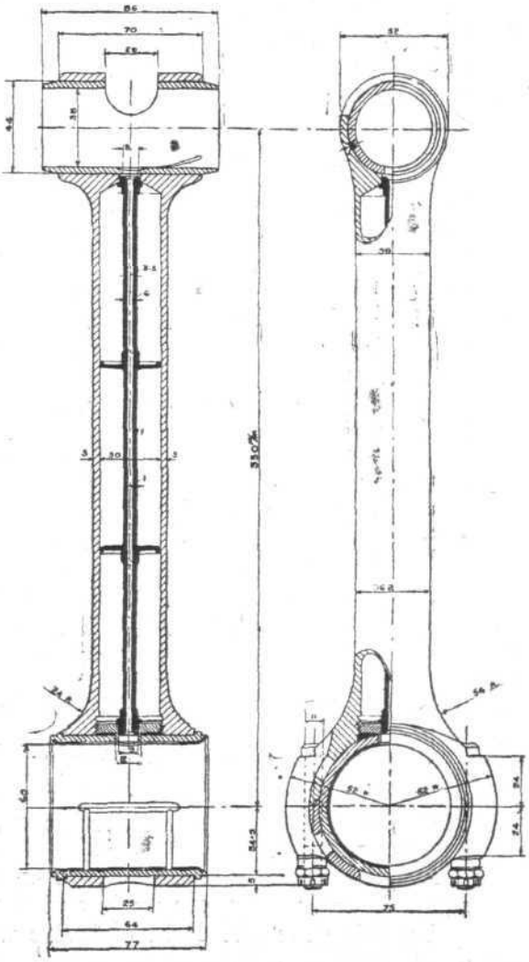


Fig. 6.—Details of connecting rod.

operates the machine gun interrupter gear and the tachometer drive.

Constructional Details.

Cylinders.—Except for the steel water jackets, the cylinders are made entirely of cast iron. The water-jacketed heads, including the twin inlet and exhaust valve passages, are cast integral with the cylinder castings.

The bore of the cylinders is 145 mm. and the thickness of the cylinder walls tapers from 5.5 mm. at the

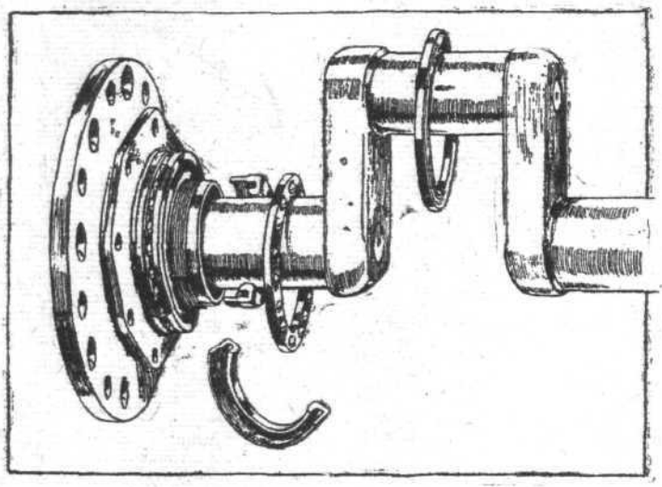


Fig. 7.—Sketch of propeller thrust race, showing split collar which secures the races in position.

base flanges to 6.5 mm. at the top of the cylinder barrels. The water jackets are of die-pressed sheet steel, built up from half sections and welded both at the vertical joints and at the bottom of the water jackets to flanges machined on the outside of the cylinder barrels. The water jackets are exceptionally long, extending to within 45 mm. of the cylinder base flanges. Seven annular corrugations are formed in the water jackets to allow for expansion, and three transversely in the sheet steel crown of the water jackets.

The water spaces formed in the cylinder-heads and the cooling of the valve pockets is well carried out. Dished plates are welded in position in the water space above the crown of each cylinder to deflect the flow of water on to the exhaust valve pockets. The diameter of the cylinder-head water connections is 60 mm.

The cylinder registers extend 10 mm. below the base flanges into the crank chamber, and are held down by four 12 mm. studs, and also by dogs at four points. The dogs are secured by long studs which pass through the top half of the crank chamber and are screwed into the bottom halves of the main bearing housings, which are cast integral with the bottom half of the base chamber. The parts of the holding-down studs which screw into the aluminium are of larger diameter and of coarser pitch. The nuts which secure the cylinder holding-down clamps are of interesting design, being of circular cupped formation and drilled radially with four 12-mm. holes for screwing up with a "Tommy Bar."

The total weight of each cylinder complete with valves, valve springs and valve rocker-supports equals 44.25 lbs.

Pistons.—The pistons, with the exception of the small conical pillars, are made entirely of cast iron, and weigh 7.62 lbs. each, complete with rings and gudgeon pin.

Three rings are provided above the gudgeon pin, the lower one being a scraper ring. The width of each ring is 8 mm., and the width of gap in cylinder equals 0.45 mm. The space between the two top rings is 4.25 mm., whilst the scraper ring is 10 mm. below the middle ring; 4-mm. pegs are provided to locate the radial position of each ring, and six 2-mm. holes are drilled in the piston below the scraper ring.

The slightly domed head of each piston is supported by a hollow conical pillar, which is machined from a steel forging and is riveted on to the underside of the piston, as shown in the sectional drawing of the piston (Fig. 5). The lower end of the conical pillar, which is machined at the same time as the holes in the gudgeon pin bosses are bored, bears on the centre part of the gudgeon pin, and to allow for this the centre portion of the top of the connecting-rod small end and gudgeon pin bush is cut away. By this construction the greater part of the force of the explosion is transmitted from the head of the piston directly to the connecting-rod.

The gudgeon pins are 38 mm. diameter, and are bored 30 mm. inside diameter. The centre portion of the gudgeon pin is 25 mm. bore for a length of 20 mm., where the conical piston head support bears on the centre of the gudgeon pin. The piston ring side clearance equals 0.004 in. The diameter at the top of the piston equals 144.15 mm. The diameter at the bottom of the piston equals 144.67 mm.

Connecting-rods.—The very clean design of the tubular connecting-rods is apparent in the photographic views, and the details of their construction are clearly shown in the sectional drawing (Fig. 6).

The whole of the connecting-rod, including the lugs for the four bolts securing the halves of the big end, is machined all over from a steel forging. The outside diameter of the tubular rod is 36 mm. and the inside is bored with a 30-mm. hole from the crankpin end to

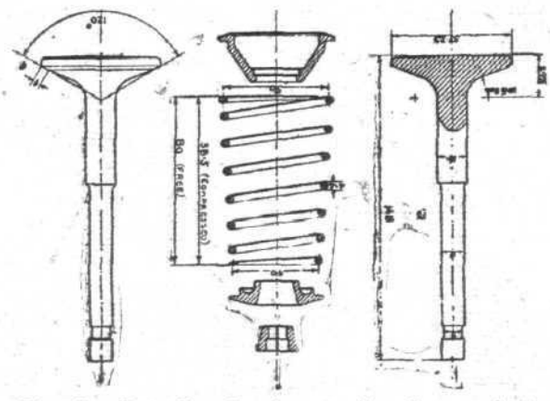


Fig. 8.—Details of valves and valve springs.

within 6 mm. of the gudgeon pin bush—the bottom end of the bore being fitted with a screwed plug.

A 6-mm. steel pipe, for lubricating the gudgeon pin, is fixed inside the centre of the connecting-rod, and the pipe is supported in the centre by two flanged discs, as shown in the drawing. The weight of the big end is lightened by four 12-mm. holes and one 30-mm. hole drilled radially through the big end. Two semi-circular oil grooves are machined in the white metal of the big end bearing caps, and one lateral groove is cut in the top portion of the big end bearing. The total weight of the complete connecting-rod is 7 lbs. 1 oz.; the big end weighing 4 lbs. 12 ozs. and the small end 2 lbs. 5 ozs.

Total big end side clearance equals 0.15 mm., and

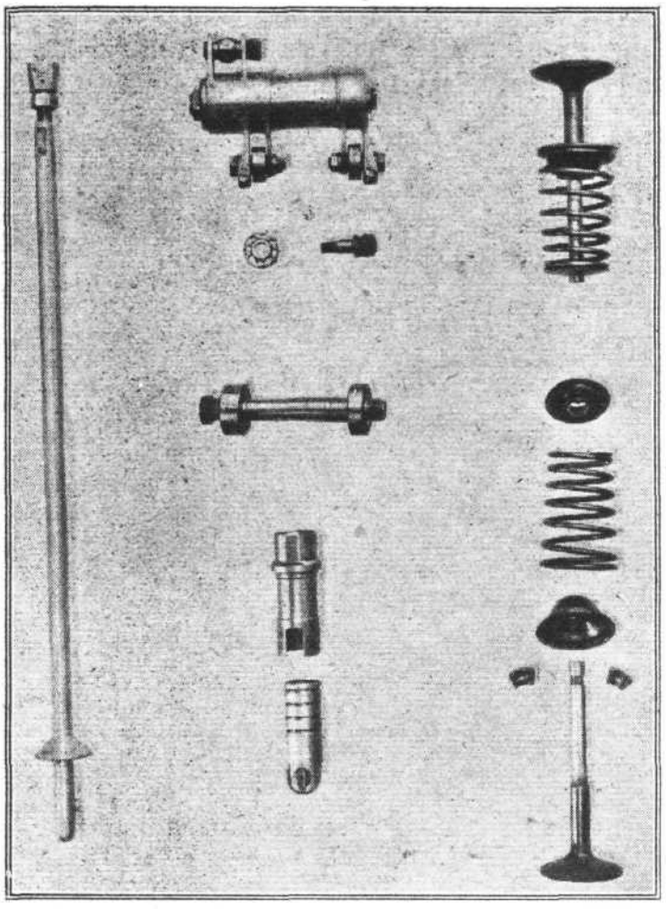


Fig. 9.—Valves and valve gear parts.

Fitted to the rear end of the crankshaft is a friction clutch for operating the wireless drive, which is designed so that the driving brake-shoes of the clutch can be thrown in or out of engagement with the driving pulley from the pilot's seat, through the action of two wedges, which operate the friction shoes through ball-ended levers.

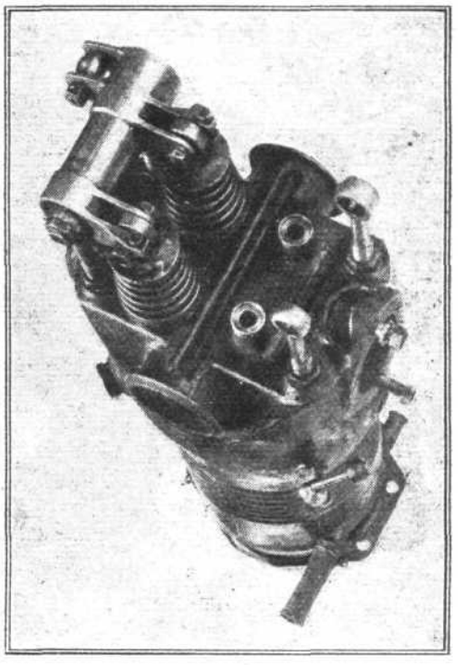


Fig. 10.—View of cylinder, showing valve rockers and formation of water jacket.

the float of the small end bush between the gudgeon pin bosses equals 14 mm.

Crankshaft.—The six-throw crankshaft runs on seven plain bearings, and weighs 109.25 lbs., including the propeller boss.

The cranks are, of course, set at 120°, and the diameter of all the journals is 62 mm., whilst that of the crankpins is 60 mm. The length of the front journal bearing (propeller end) equals 79 mm., and the length of the other journal bearings equals 54 mm., with the exception of the rear end bearing, which is 55 mm.

The crankshaft journals and crankpins are bored for lubrication, the webs being drilled with communicating holes in the usual manner. The internal diameter of the holes bored in both the crankpins and journals is 27 mm. The ends of the holes are plugged with sheet steel discs sweated into the recessed ends of holes, and all the discs which plug the rear ends of the holes in both the crankpins and journals are drilled with a central 5-mm. hole, presumably with the idea of lubricating the camshafts with the oil thrown out by the cranks.

A double-thrust ball race, 120 mm. diameter, is fitted at the front end of the crankshaft behind the front flange, to which the propeller hub is bolted. The thrust races are large enough to be assembled over the cranks, and are secured in position by a split collar which is screwed on to the crankshaft. The halves of the split collar are held together on the screw thread on the shaft by a recess cut in the split collar. This recess holds a corresponding flange turned on the crankshaft. Details of this construction are shown in the sketch in Fig. 7.

The propeller boss is attached to the crankshaft by a flange which is bolted to a corresponding flange on the end of the crankshaft by eight 14-mm. bolts. Full details of the propeller boss are given in the sectional drawing (Fig. 21).

Valves and valve gear.—The twin inlet and exhaust valves work vertically in the cylinder heads, and are operated as previously mentioned by rockers mounted on ball-bearings, carried by supports screwed into the cylinder head. The general design of the valves and valve springs is shown in Figs. 8 and 9.

The rocker levers operate the valve stems through hardened steel rollers which are mounted on eccentric bolts. These, in conjunction with adjustable

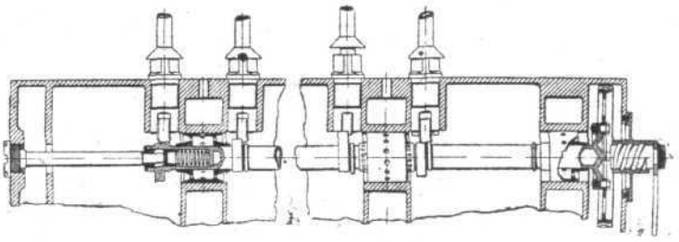


Fig. 11.—Arrangement of exhaust camshaft and half-compression gear.

spherical joints screwed into the top ends of the vertical push rods on each side of the cylinders, give a fine adjustment for the tappet clearances. The spherical joints on the valve rockers are evidently provided to simplify the alignment of the valve rocker supports which are screwed into the cylinder heads.

Semi-spherical joints are also provided at the

bottom ends of the push rods, which work in steel cups inside the hollow tappets, and it should be noted that the hardened steel rollers of the tappets are slightly off-set from the camshaft centres, and each pair of tappet guides is held in position by a steel bridge clamp.

The dimensions of both the inlet and exhaust valves are the same, each valve weighing 1.25 lbs. The lift of the inlet valve equals 0.465 in., and lift of the exhaust valve equals 0.443 in. Clearance of inlet tappet equals 0.009 in., exhaust 0.015 in.

Camshafts.—The hollow camshafts each run in three plain phosphor-bronze bearings, and are arranged inside the top half of the crank chamber. The camshaft bearing bushes, which are hollow, are 53 mm. outside diameter, and are split on the camshaft axis and held together by wire rings on either side to allow the camshafts to be easily inserted in the crankcase. The bearings are located by grub screws screwed in from the outside of the crank chamber.

The camshafts are driven by gears from the intermediate gear wheel which meshes with the crankshaft distribution pinion, and arranged inside a casing formed at the rear end of the crankcase. The camshaft gears are bolted to the camshafts by drilled flanges, which provide a vernier adjustment for setting the camshafts.

Half compression cams are arranged on the exhaust camshaft in the usual manner. The laternal movement of the floating camshaft is effected by a small lever at the rear end of the crankcase, which operates a two-start square thread screw of 24 mm. pitch. The camshaft is returned to its normal running position by a spring arranged inside the front end of the hollow camshaft. Further details of this half compression gear are shown in Fig. 11.

The half compression cams open the exhaust valves at 35° E., and close at 22° L.

(To be concluded.)

R.F.C. Prisoners in Switzerland.

A PARTY of British prisoners of war who arrived in Berne from Germany on November 28th included the following R.F.C. officers :—

Captain Briggs, Lieutenants Macintosh, Harvey, Pinder, Dalzell, and Russell.

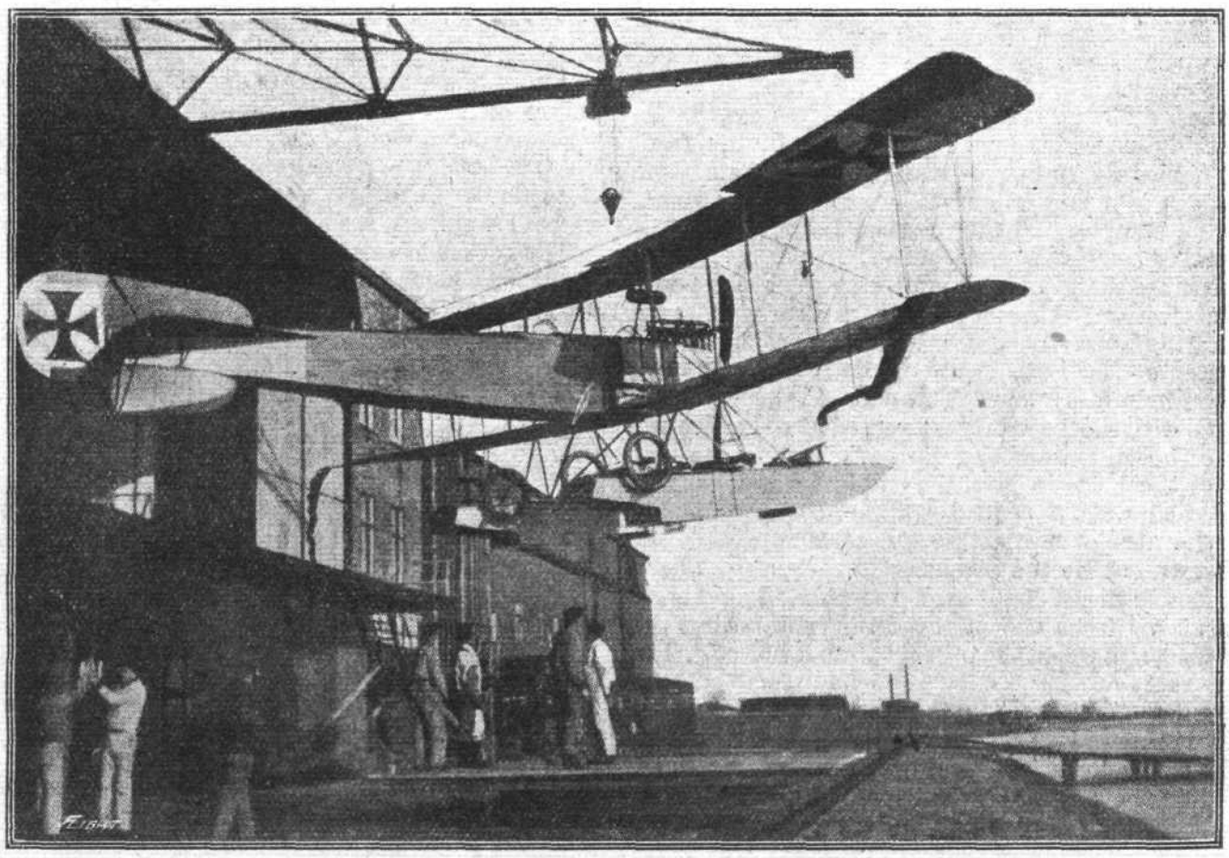
Escape of Flight-Commander Moon.

IT is good news to hear that Flight-Commander Moon, R.N.A.S., who some months ago fell into the hands of the enemy in German East Africa, has rejoined the British forces. At the beginning of the year he was reported killed in action, but it was afterwards ascertained that his seaplane, which also carried Commander Bridgman, D.S.O., fell into the Mbumi River, owing to magneto failure. The two officers were washed out to sea on a raft, and Commander Bridgman died from exposure, but Flight-Commander Moon eventually succeeded in reaching the shore.

Fatal Accidents.

AT the inquest held at Southend on November 24th on Capt. C. W. Bruce, Gordon Highlanders, attached R.F.C., who was killed while flying at Rochford on November 22nd, a verdict of " Accidental Death " was returned.

An inquest was held on November 30th on 2nd Lieut. J. C. Cunningham, R.F.C., who died in hospital on November 28th as the result of an aeroplane accident. It appeared that Lieut. Cunningham was making his final test before being passed for service oversea. In taking a turn he came into collision with some trees. The aeroplane took fire, and he was so badly burned that he died in hospital a few hours later. The jury returned a verdict of " Accidental Death."



HOISTING HER HOME.—Bringing a German seaplane into its hangar by means of a crane.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

THE FLYING SERVICES FUND, administered by THE ROYAL AERO CLUB.

The Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 3, Clifford Street, New Bond Street, London, W. 1.

Subscriptions.	£	s.	d.
Total subscriptions received to Nov. 27th, 1917	12,483	13	8
Staff and workers of Gwynnes, Ltd. (fifty-first contribution)	10	6	10
G. H. Mansfield, Managing Director of the Aircraft Supplies Co., Ltd., 125, Long Acre, W.C. 2; Proceeds of the Sale of copies of "Standard A.G.S. Parts for Aircraft," by Bernard Isaac (Eleventh contribution, making a total of £41 14s. 4d.)	3	12	6
Total, December 5th, 1917	12,497	13	0

H. E. PERRIN, Secretary.
3, Clifford Street, New Bond Street, W.1.

THE ROLL OF HONOUR.

REPORTED by the Admiralty:—

Killed.

Flight Lieut. (Acting Lieut. R.N.) E. B. Devereux, R.N.
Flight Sub-Lieut. G. S. Smith, R.N.

Previously Missing, now reported Killed.

Acting Flight-Comdr. P. A. Johnston, R.N.

Died of Injuries.

Prob. Flight Officer I. H. Blake, R.N.

Missing (feared Drowned).

Flight Sub-Lieut. R. G. MacAloney, R.N.

Accidentally Injured.

Prob. Flight Officer A. C. Davis, R.N.

Previously Missing, now reported Prisoner.

Flight Sub-Lieut. G. Andrews, R.N.

Reported by the War Office:—

Killed.

Capt. A. B. Cook, R.F.C.
2nd Lieut. S. B. H. Coppard, R.F.C.
2nd Lieut. W. R. Cutler, R.F.C.
2nd Lieut. W. C. Davey, A.S.C., attd. R.F.C.
Lieut. A. C. N. M. P. de Lisle, R.F.C.
Lieut. E. C. J. Elliott, R.F.C.
2nd Lieut. H. J. Gates, Buffs, attd. R.F.C.
Lieut. M. Halligan, R. Dub. F., attd. R.F.C.
Capt. D. S. Hall, M.C., A. and S. Hrs., attd. R.F.C.
2nd Lieut. D. W. Hardie, R.F.C.
2nd Lieut. E. P. Hartigan, R. Muns. F., attd. R.F.C.
2nd Lieut. H. E. Jones, R.F.C.
2nd Lieut. S. H. Pilkington, Aust.F.C.
2nd Lieut. J. P. Waters, R.F.C.
2nd Lieut. E. S. Weiss, R.F.C.
2nd Lieut. R. M. Whitehead, R.F.C.
F5039 Air-Mech. 1st Gr., B. F. Dolley, R.F.C.
67427 2nd Air-Mech. C. T. Gardner, R.F.C.
106015 3rd Air-Mech. D. McNeil, R.F.C.
65142 2nd Air-Mech. A. Morley, R.F.C.
317 B. G. Russon, Aus.F.C.

Died of Wounds.

2nd Lieut. G. J. Bakewell, R.F.C.
2nd Lieut. W. A. Barnett, R.F.C.
2nd Lieut. J. R. Blair, Aus.F.C.
2nd Lieut. J. T. Booth, R.F.C.
Lieut. H. E. Darrington, Mdx., attd. R.F.C.
2nd Lieut. W. N. Hemming, R.F.C.
2nd Lieut. G. R. Horsfall, R.F.C.
2nd Lieut. W. S. McLaren, R.F.C.
2nd Lieut. N. C. Phear, R.F.C.
2nd Lieut. H. J. Stone, R.F.C.

Previously reported Missing, now reported Killed.

2nd Lieut. J. S. Holroyde, E. Yorks, attd. R.F.C.
2nd Lieut. J. G. White, Sco. Rif., attd. R.F.C.

Previously reported Missing, now reported Died of Wounds as Prisoner in German hands.

2nd Lieut. L. C. Chapman, R.F.C.

Died.

1907 F. S. A. Irwin, Aus.F.C.
405307 1st Air-Mech. W. A. Weaver, R.F.C.

Wounded.

Capt. J Bell, R.F.C.
2nd Lieut. E. Brewer, R.F.C.
2nd Lieut. P. J. Cayley, Glouc., attd. R.F.C.
2nd Lieut. J. P. Coleman, R.F.C.
Lieut. T. C. Creaghan, W. Ont., attd. R.F.C.
2nd Lieut. J. Cushry, R.F.C.
2nd Lieut. V. M. de Belabre, N'land F., attd. R.F.C.
2nd Lieut. J. Elder-Hearn, R.F.C.
Capt. W. R. Fish, R.F.C.
2nd Lieut. E. D. S. Groome, R.F.C.
Capt. G. E. W. Hitchcock, R.E., attd. R.F.C.
2nd Lieut. R. B. Hooper, R.F.C.
Lieut. C. L. Johnson, Aus.F.C.
2nd Lieut. C. E. Kennedy, R.F.C.
2nd Lieut. D. W. Lane, R.F.C.
2nd Lieut. W. A. McCulloch, R.F.C.
2nd Lieut. W. F. Mayoss, R.F.C.
2nd Lieut. P. J. Moloney, R.F.C.
2nd Lieut. L. H. Phelps, Linc., attd. R.F.C.
Lieut. H. S. Robertson, R.F.C.
2nd Lieut. E. C. Rogers, R.F.C.
2nd Lieut. J. K. Smith, Lancs F., attd. R.F.C.
2nd Lieut. E. Thomas, R.F.C.
2nd Lieut. F. C. Wallis, Worc., attd. R.F.C.
Captain R. N. Walton, R.F.A., attd. R.F.C.
2nd Lieut. F. L. Watson, R.F.C.
2nd Lieut. C. R. F. Wickenden, R.F.C.
Lieut. L. B. Williams, R.F.C.

Unless otherwise stated the following are air-mechanics in the R.F.C., the figures in the brackets indicating the grading:—

Sergt. G. A. Bock 30221, S. E. Darling 9155 (1st), G. L. Goodger 10098 (1st), A. R. Hill 7984 (1st), J. Hill 11972 (2nd), W. H. Purchase 44252 (2nd), Z. W. W. Woffendale, 12663 (1st), H. V. Bate 44974 (2nd), F. W. Boyce 8980 (1st), B. Hazlewood 106252 (3rd), T. Kilgallon 106001 (3rd), F. W. Nicholls 58198 (3rd), A. J. Woodhouse 37316 (1st).

Previously Missing, now reported Missing, believed Killed.

2nd Lieut. C. H. Barton, R.F.C.
2nd Lieut. H. L. Marvin, R.F.C.

Previously reported Prisoner, now reported Wounded and Prisoner in German hands.

Lieut. P. J. Casey, R.F.C.

Missing.

Lieut. R. E. Angus, Yeo, attd. R.F.C.
2nd Lieut. T. L. Atkinson, R.F.C.
2nd Lieut. G. A. Cranswick, Y. and L., attd. R.F.C.
Capt. G. B. Crole, M.C., R.F.C.
2nd Lieut. G. W. Hall, R.F.C.
2nd Lieut. S. S. Henry, R.F.C.
2nd Lieut. W. C. V. Higginson, R.F.C.
2nd Lieut. T. J. Kent, R.F.C.

Lieut. J. M. Leach, Yorks. R., attd. R.F.C.
2nd Lieut. H. P. Ledger, R.F.C.
2nd Lieut. E. F. Marchand, R.F.C.
Lieut. R. Mayberry, R Sco. Fus., attd. R.F.C.
2nd Lieut. O. W. W. H. Meredith, R.F.C.
2nd Lieut. T. P. Morgan, R.F.C.
2nd Lieut. M. W. B. Stead, R.F.C.
88288 Sergt. W. J. Benger, R.F.C.
7124 Sergt. H. L. Clear, R.F.C.
47302 Sergt. C. L. Randell, R.F.C.

Previously reported Prisoners, now reported Died of Wounds as Prisoners in German hands.

Capt. C. G. Guy, North'n R., attd. R.F.C.
Lieut. K. W. McDonald, R.E., attd. R.F.C.

Previously reported Missing, now reported Prisoners in German hands.

Lieut. J. S. Godard, Can. Eng., attd. R.F.C.
Lieut. G. R. Long, Manit., attd. R.F.C.
2nd Lieut. F. M. Nash, R.F.C.
2nd Lieut. F. J. Ortweiler, R.F.C.
2nd Lieut. S. M. Park, R.F.C.
2nd Lieut. E. Scholtz, R.F.C.
2nd Lieut. A. E. Turvey, R.F.C.
2nd Lieut. W. E. Watts, R.F.C.
2nd Lieut. W. H. Winter, R.W. Surr. R., attd. R.F.C.
2nd Lieut. H. C. Wookey, Glouc., attd. R.F.C.
2nd Lieut. F. L. Yeomans, R.F.C.

Prisoner in Turkish hands.

Lieut. J. D. G. MacRae, Sea. Highrs., attd. R.F.C.

THE AIR FORCE BILL IN PARLIAMENT.

THE Air Force Bill was considered in the House of Lords on November 27th.

Earl Curzon said that it was important and urgent that this measure should receive the Royal Assent as speedily as possible. He added that since the second reading of the Air Force Bill was agreed to Lord Rothermere (who had taken his place on the front bench) had been appointed Air Minister. He said he was expressing the feeling of all their Lordships when he wished his noble friend every success in the extremely onerous and responsible duties which he had undertaken. One of the first of those duties would be the selection of the members of the Air Council to be established by the Bill, and it was essential that that step should be taken without delay.

Lord Sydenham, speaking on the motion to go into Committee, welcomed the foundation of the Air Force as a distinct arm of the Service, and said he wished that step had been taken earlier. The extreme importance of the Air Service was being demonstrated every day, and it seemed not too much to say that the most efficient air force might win the war. The Germans were making every effort, not merely to meet the danger which they foresaw against them in the air, but to develop their air raids upon London, which they foolishly imagined would weaken our determination, and hamper us in the war. If ever the inner history of our handling of the Air Force came to be written, he feared it would make melancholy reading. The Earl of Crawford, in moving the second reading of the Bill, had admitted that there had been waste of material and a want of concentration in effort. Hitherto the Air Board had suffered owing to a lack of sufficient powers, and it had never been a properly organised body. Considering its limitations and disabilities, it had done wonderful work, for which the country ought to be grateful to Lord Cowdray. The divorce of the design from the manufacture of aircraft had been a mistake. The Air Board in 1916 was actually compelled to plead with the Ministry of Munitions for priority of supply in respect of a quantity of material. Since then the Ministry of Munitions had evidently been awakened to the needs of the Air Service, and the speed of manufacture had been very much increased. That was a national gain. The Bill was remarkable in respect of the number of matters referred to in it which it left to be settled by Order in Council. He asked whether in the future the whole responsibility for the design and manufacture of aircraft of all kinds would rest entirely with the Air Council; whether all aeronautical inventions, experiments, and research and the armament of all aircraft would centre in that Council; and whether the whole of the training of the Air Force, the provision of aerodromes, and all anti-aircraft forces would be brought under the control of the Air Council. The Bill said nothing as to the kind of Council which was contemplated. The Air Ministry would require a most capable General Staff and a first-class Inventions Department, and it must keep in close touch with the General Staffs of the War Office and the Admiralty. He was convinced that the creation of a separate Air Service had become a necessity, and he wished the Bill had provided for the linking up of the air services of the Dominions in the future.

The Earl of Crawford said he could not give many of the details Lord Sydenham had asked for because of the decision of the authorities that no cut-and-dried scheme should be placed on the Statute Book at this early stage in the history of the force. It was not to be tied down to something which in practice might prove inconvenient and could not be changed without coming to Parliament for an amending Act. Orders in Council provided a certain amount of elasticity, and that was the ground on which the Bill presented an outline rather than a completed canvas. The broad idea was that the Air Council would have powers with regard to the Air Service corresponding with those of the Army Council in respect of the land military service and the Admiralty in respect of the naval service. The Secretary of State would correspond in rank with the Secretary of State for War and the First Lord of the Admiralty, and members of the Council would be allotted specialised functions. The responsibility for all designs and the correct execution would rest with the Air Minister; but the actual work would be supervised and carried out by the Minister of Munitions. The Air Ministry would have its own finance and estimates, but the Munitions Department, as the manufacturing branch, would carry some of the expenditure. In course of time the Air Service, so far as finance was concerned, would occupy the same position as the Army and Navy.

Viscount Haldane said that the Army Act had no effect except as it was kept alive by an annual enactment, and he was glad to see that the same constitutional principle was observed in the Air Force Bill.

The motion was agreed to, and the House went into Committee, the Earl of Kintore in the Chair.

The Earl of Crawford moved to insert the following paragraph in the first schedule of the Bill:—"Provided that under regulations made by the Army Council and Air Council the officers and airmen of a body of the Air Force acting with any body of his Majesty's military forces on active service, or any of such officers or airmen, may, in such manner and in such circumstances, and subject to such conditions as may be provided by or under those regulations, be made subject to military law, and in such case they shall be subject thereto in like manner as if they were officers and airmen attached to the Army." This was, he explained, a provision analogous to that under which soldiers while on board ship were brought within the scope of the Navy Discipline Act.

The amendment was agreed to, as was also another amendment to insert in the second schedule a provision "that under regulations made by Air Council and Army Council, the officers and soldiers of a body of his Majesty's military forces acting with any body of the Air Force on active service, or any of such officers or soldiers, may, in such manner and in such circumstances and subject to such conditions as may be provided by or under those regulations, be made subject to this Act, and in such case they shall be subject thereto in like manner as if they were officers and soldiers attached to the Air Force."

The Bill, as amended, was reported to the House, and was immediately read a third time and passed.

The amendments made to the Bill in the House of Lords were considered in the House of Commons on November 28th.

Lords amendment: In paragraph on Section 176 of Army Act, leave out the words "or lent."

Mr. Pringle: It is due to the House that the hon. gentleman in charge of the Bill should give some explanation of the amendments introduced by the Lords After the very long attention we gave to the Bill we should have some explanation of the changes that have been made in another place.

The Parliamentary Secretary to the Air Board (Major Baird): This is a purely drafting amendment. I did intend to explain the subsequent one.

Question put, and agreed to.

Lords amendment: In paragraph on Section 184 (*a*) of Army Act, at end, insert the words:—

"Provided that under Regulations made by the Army Council and Air Council the officers and airmen of a body of the Air Force acting with any body of His Majesty's military forces on active service, or any such officers or airmen may, in such manner and in such circumstances and subject to such conditions as may be provided by or under those Regulations, be made subject to military law, and in such case they shall be subject thereto in like manner as if they were officers and airmen attached to the Army."

Major Baird: This and a subsequent amendment to the paragraph on Section 84 of the Army Act are the only amendments that are not of a purely drafting character. The purpose of these two amendments is to enable the Air Council to apply military law to any body of the Air Force when it is serving with the Army, in the event of its being necessary, having regard to local conditions. Hon. members will realise that that might become necessary in a case such as this: An Air Force man falls ill and is put in a military hospital. He is in fact, under Air Force law, and he cannot be dealt with by the Army. In cases of that sort is might be desirable to put him under military law. If you had a very large body of the Air Force serving with a very small force of the Army the same action might be desirable in the opposite direction. The amendment is permissive, and gives power to apply military law, with the assent of the Air Council and the Army Council, to airmen, or to apply the Air Force law, with the assent of the Air Council and the Army Council, to soldiers.

Mr. Billing: Can the hon. gentleman say what is the position in regard to the airmen who are lent to the Navy, do they come under naval law?

Major Baird: That is set forth in the Bill. Like everybody else serving on board His Majesty's ships, they come under naval discipline.

Lords amendment agreed to.

Lords Amendment: In Part I., leave out the words "or His Majesty's Regular Forces."

Agreed to.

Lords amendments: In Part II., in paragraph on Section 32 of Army Act, leave out the words "before 'forces' wherever that word occurs," and insert instead thereof the words "after 'His Majesty's' wherever those words occur."

Agreed to.

In paragraph on Section 175 of the Army Act, after the word "Act" ["subject to that Act"], insert the words "In Sub-section (2) 'any of' shall be omitted."

Agreed to.

Lords Amendment: In Part II., in paragraph on Section 84 of the Army Act, after the word "be" ["as the case may be"], insert the words,

"Provided that under Regulations made by Air Council and Army Council the officers and soldiers of a body of His Majesty's military forces acting with any body of the Air Force on active service, or any of such officers or soldiers, may, in such manner and in such circumstances and subject to such conditions as may be provided by or under those Regulations, be made subject to this Act, and in such case they shall be subject thereto in like manner as if they were officers and soldiers attached to the Air Force."

General Sir Ivor Philipps: I think we need some explanation as to whether this Regulation will be laid upon the Table of this House before coming into force. Here we are placing 5,000,000 officers and men under the command of an entirely new force. I have no doubt that in time the Air Force will be a properly organised and disciplined force, but at the present time there is no security for that, and it is a very bold and drastic step to take in military discipline to place the lives and liberties of 5,000,000 officers and men in this more or less casual way under an entirely new force. I think there should be some protection for the officers and men, who may know nothing of these Regulations, and I should like to know whether it is proposed to lay the Regulations on the Table before they come into operation.

Major Baird: I think the fears of the hon. and gallant gentleman are scarcely justified. The protection of officers either of the Army or of the Air Force can, I think, safely be left in the hands of the Army Council or the Air Council. It is only subject to the consent of these two bodies that any arrangements can be made, and I think we may leave it in the hands of these bodies to take only such steps as are necessary for an efficient and proper organisation. As the right hon. and gallant member must be aware, the two Acts are almost identical, the Army Act and the Air Force Act only differing in the sense that the Air Force Act contains provisions necessary to make the Army Act applicable to the Air Force. Therefore, I do not think there need be any alarm that any injustice will be done to officers or men of the Army who come under the jurisdiction of the Air Force.

Lords amendment agreed to.

FLIGHT

QUESTIONS IN PARLIAMENT.

"National" Air Service?

MR. LYNCH, on November 20th, asked the Prime Minister whether, with a view to rendering the Service universally attractive, he will advise that the style and titles Royal Flying Corps and Royal Naval Air Service be changed by the substitution of the word National for Royal?

Mr. Bonar Law: The answer is in the negative.

Defence of London.

MR. LYNCH asked the Prime Minister whether, in view of the peril to which London is exposed on account of the development of aircraft offensive by the Germans, he can give the House the assurance that, within the control of the authorities concerned in the defence of London, there is constituted what might be called a thinking department whose duty it is intelligently to foresee the effects of German activities and to advise appropriate and adequate preparations to defeat them and to avoid the disadvantages of being taken by surprise and being compelled to substitute plausible explanations for vigorous and effective fighting action?

Mr. Bonar Law: The answer is in the affirmative.

Mr. Lynch: If a thinking department exists why does it never commence to think until after the event?

Volunteers and Air Raids.

MR. YEO, on November 21st, asked the Under-Secretary of State for War whether he will allow members of the Volunteer Force to wear uniform when on duty during air raids, as in the case of the Voluntary Aid Detachment, in view of the greater authority uniform would give in regulating crowds?

Mr. Macpherson: If Volunteers are employed under the authority of the General Officers Commanding-in-Chief concerned on temporary service during air raids, they would wear uniform. If, however, my hon. friend is referring to a proposal that the Volunteers should assist the civil police on these occasions, this has not been approved.

Air Raid Damage Compensation.

MR. HINDS, in the House of Commons on November 26th, asked the Chancellor of the Exchequer whether under the air raid compensation scheme persons whose property exceeds £500 in value, and such excess is not insured under the scheme, will be compensated, and, if so, to what extent; and whether compensation will be paid for the loss of money, securities, stamps, documents, manuscripts, or books of account, consequential loss, or theft?

Mr. Wardle: My right hon. friend has asked me to answer this question. I am sending the hon. member a copy of the scheme, from which he will see what are its general principles, and I will consider the special case he has in mind if he will be good enough to send me fuller particulars. The answer to the last part of the question is in the negative.

Patrol Committees.

MR. BROOKES asked the Home Secretary whether, in view of the appointment of patrol committees in various London boroughs to promote public safety and convenience on the occasion of air raids, he will authorise the police authorities to give them the maximum of information and assistance?

Sir G. Cave: I do not know to what committees the hon. member refers, but the police have full authority to give such information and assistance to the public as they may deem necessary.

Mr. Brookes: Would the right. hon and learned gentleman wish me to supply him with particulars of these committees?

Sir G. Cave: I shall be glad to receive any information the hon. gentleman likes to send.

Royal Flying Corps.

MR. GILBERT, on November 28th, asked whether the rule that officers and men are not to be sent overseas until they reach the age of 19 years appliest to the Royal Flying Corps?

Mr. Macpherson: No, Sir; the Royal Flying Corps was particularly exempted by an Army Council Instruction of December 8th, 1916. It was found impracticable to apply the rule to this branch of the Service owing to the fact that a large number of the best pilots begin their training at the age of 18 and become proficient and fully qualified long before they reach the age of 19.

Air Services (New Uniform).

MR. BILLING, on November 28th, asked the Prime Minister whether his attention has been called to the fact that it is the intention to introduce a new uniform for the Air Services as and when the existing naval and military uniforms were worn out; and, under these circumstances, will he say whether it is intended that during the interregnum there will simultaneously be three officia uniforms for the Air Service?

The Parliamentary Secretary to the Air Board (Major Baird): The position will be as indicated in the second part of the hon. member's question. Any other system would be extravagant, and would involve difficulties of supply which will be avoided by a gradual change over from the existing to the new uniforms.

Mr. Billing: Are we to understand that a grant will be made to officers to enable them to get this uniform, or will they have to buy it out of their own pocket?

Major Baird: I must ask for notice of that question.

Air Raid Insurance.

SIR HAROLD ELVERSTON asked the Chancellor of the Exchequer whether the contingency of loss of rent through damage caused by enemy aircraft is covered by the Government scheme of insurance against damage by enemy aircraft; and, if not, whether arrangements will be made to cover this loss?

Mr. Wardle: My right hon. friend has asked me to answer this question. Loss of rent can be insured against under the insurance scheme, but is not covered by the free compensation scheme.

Sir H. Elverston asked the Chancellor of the Exchequer whether, under the Government scheme of insurance against damage by enemy aircraft, the sum of £500 is the total amount of free compensation an owner can recover, no matter how many losses are sustained, or whether this sum of £500 applies to losses sustained within a fixed period?

Mr. Wardle: My right hon. friend has asked me to answer this question. Each case of damage is dealt with separately on its merits, and if it comes within the terms of the Compensation Scheme compensation would be payable, whether the owner had been compensated in respect of previous raids or not.

Lord Rothermere.

MR. P. A. HARRIS, on November 29th, asked the Prime Minister on what terms Lord Rothermere has been appointed Secretary of State for Air; whether he is to share with other Ministers joint responsibility for the general policy of the Government; and whether he will continue to act as a director of the various newspapers hitherto under his control, or whether, following precedent, he will resign all directorships?

Mr. Bonar Law: As regards the first part of the question, I would refer the hon. member to Clause 8, sub-section (1), of the Air Force Bill. As regards the second part, I am informed that my noble friend has resigned all his directorships.

Air Council.

MR. BILLING, on December 3rd, asked the Prime Minister what further appointments have been made in connection with the Air Ministry; and when it is proposed to initiate the measures provided for in the new Act?

Mr. Bonar Law: No appointments on or under the Air Council can be made until the issue of the Orders in Council provided for in Section 8, Sub-sections (1) and (2) of the Air Force Act. The work preparatory to the carrying out of the measures provided for in the Act is being proceeded with.

Applications for Commissions.

MR. BILLING asked the Prime Minister whether men desirous of obtaining a commission in, or joining the ranks of, the Air Service are to apply to the Admiralty, to the War Office, or to the new Air Ministry; and what is the procedure?

Mr. Bonar Law: Ample notice will be given of any change from the procedure hitherto in force in regard to entry into the Air Services.

THE CIVIL AERIAL TRANSPORT COMMITTEE.

MR. BILLING, on December 3rd, asked the Prime Minister if he has received a Report as to the progress and recommendations, if any, of the Civil Aerial Transport Committee; how many sittings this Committee has held within the last six months;-whether any changes have been made in its personnel during this period; what is the annual cost to the State of this Committee, including salaries, rent, rates, taxes, printing, posting, and stationery; and whether this Committee is to be continued?

Mr. Bonar Law: No Report has yet been received from this Committee, but I understand that its Report may be hoped for in the early part of next year. The Civil Aerial Transport Committee itself held two meetings immediately after its formation, when it was decided to divide the subjects of inquiry into five different branches to be considered by five Sub-committees, which have held altogether 31 meetings. Some of these Sub-committees have sent in Reports to the Parliamentary Secretary to the Air Board, who is acting chairman of the main Committee, and the others are expected to do so shortly.

During the last six months Lord Northcliffe, who was originally chairman, Major-General Brancker, Lord Montagu of Beaulieu, Mr. Claude Johnson, and Mr. Tyson Wilson have left the Committee, in consequence of other duties, while Sir G. Perley, Major-General McCay, and Sir Mackenzie Chalmers have been added to the main Committee, to represent the Dominion of Canada, the Commonwealth of Australia, and the Home Office respectively. Sir E. Morris, the Prime Minister of Newfoundland, is also joining the Committee. In addition, a number of gentlemen with special knowledge of the particular subjects of inquiry have been co-opted on the various Sub-committees. Their names are as follows:—

Mr. Butler Aspinall, K.C.	Sir Frank Heath.
Major the Right Hon. H. T. Baker.	Major H. Lyons, F.R.S.
Mr. L. Bairstow, F.R.S.	Mr. Arthur Morley.
Captain F. S. Branwell.	Professor J. E. Petavel, F.R.S.
Mr. R. O. Cary.	Mr. F. Pick.
Mr. A. E. Chorlton.	Captain E. Elvey Robb.
Mr. W. Barnard Faraday.	Squadron Commander the Master of Semphill, R.N.
Sir R. T. Glazebrook.	Major Vincent Smith, M.C.
Wing Captain Groves, R.N.	Major G. I. Taylor.
Mr. Nevile Gwynne.	Mr. A. E. Turner.
Mr. H. J. Wilson.	

The direct cost of the Committee, apart from services rendered to it by other Departments, such as the Stationery Office, and some trifling payments for travelling expenses, is at the rate of £600 per annum, being the amount of the salaries paid to the assistant secretaries.

It is proposed to continue the Committee in existence till it has presented its Report.

◈ ◈

Enemy's Activity on Italian Front.

HARDLY a day passes without an attack by enemy aeroplanes upon the Italian observation balloons, says Mr. Ward Price, writing to the *Times* from Venice on November 30th. Two contrived to get within striking range early this week by an ingenious trick. They approached firing at each other and going through all the manœuvres of an aeroplane duel. Until they had come close enough for the shape of the machines to be clearly seen, the Italian look-outs naturally mistook them for an Austrian aeroplane being attacked by an Italian. The enemy machines were able in this way to get close to the observation balloon without being molested. Then the stratagem was discovered and the balloon began to be quickly hauled down. It would have been saved if the winding-gear had not unfortunately jammed, with the result that the enemy airmen were able to set fire to it.

The *Times* correspondent at the Italian Headquarters, writing on December 2nd, says there is evidently a determined desire that the Italians shall not see from the air the traffic on the roads, for endeavours are being made to form a barrier with lines of hostile craft, among which are many German machines. Two Italian scouting aeroplanes, convoyed by 10 chasers, were, for example, yesterday attacked the moment they were seen by 23 Austrian and German chasers, some of the new whitey "invisible" type.

INTERNATIONAL AIRCRAFT STANDARDS.

(*Continued from page* 1249.)

3S17—*Specifications for Steel Wire for Electric Welding.*

GENERAL.—1. The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

MATERIAL.—2. (*a*) The material from which the wire is manufactured shall be made by any approved process.

(*b*) The I.A.S.B. standard steel No. 1015 shall be used; a carbon content of from 0.13 to 0.18 per cent. is desired.

WORKMANSHIP AND FINISH.—3. (*a*) Electric welding wire shall be of the quality and finish known as "Bright," "Bright Hard," or "Soft Finish." "Black Annealed" or "Bright Annealed" wire shall not be supplied

(*b*) The surface shall be free from scale, lime, copper, or other metals. A moderate coating of rust or of lubricant used in the drawing of the wire is permissible.

PHYSICAL PROPERTIES AND TESTS.—4. A dead soft wire is not desired. In order to detect wire of this kind from one to three samples shall be selected from each 10,000 lb. (4,536 kg.) or less submitted for inspection, and a test made for elongation (in tension) over a gauge length of 10 in. (254 mm.). When two or more samples show an elongation greater than 5 per cent. the wire shall be rejected.

DIMENSIONS AND TOLERANCES.—5. (*a*) All wire for this purpose shall have the size specified on orders in decimal parts of an inch (or millimetre). The wire shall be supplied, inspected and reported in the same manner.

(*b*) Great accuracy in gauge is not necessary, but no wire varying more than 3 per cent. plus or minus shall be accepted.

DELIVERY, PACKING AND SHIPPING.—6. (*a*) Steel wire for use in electric welding shall be furnished in coils or straightened and cut to lengths as required.

(*b*) If not furnished in coils, the wire, straightened and cut to 36-in. (914 mm.) lengths, plus or minus 1 in. (25.4 mm.), shall be packed in bundles weighing from 50 to 75 lb. (22.68 kg. to 34.02 kg.) each and securely tied with two or more wire bands.

(*c*) All bundles shall be burlapped all over for shipment, and shall be marked with a metal tag containing the name of the manufacturer, the size, length of contents and the inspection mark.

INSPECTION AND REJECTION.—7. Inspection for gauge, finish and chemical analysis shall be made on this wire before cutting it into straightened lengths. The wire shall then be cut to length and subsequent optional check inspection may be made by the Government inspector at the plant of the manufacturer.

3S5—*Specifications for Alloy Steel Bars and Billets.*

(150,000 lb. per sq. in. Tensile Strength).

GENERAL.—1. The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

MATERIAL.—2. The material for these bars shall be chosen from among the I.A.S.B. standard alloy steels listed below. The composition chosen shall be stated by the manufacturer or contractor, and is further limited as follows: Carbon, not over 0.45 per cent.

MANUFACTURE.—3. (*a*) The steel shall be manufactured or at least finished by the open-hearth electric furnace or crucible process.

(*b*) A sufficient discard shall be made from each ingot to secure freedom from piping and undue segregation.

(*c*) The billets from which the bars are made are to be rough turned or chipped to remove all surface defects which might produce seams in the finished bar. No undercutting in chipping will be allowed.

Heat Treatment.—(*d*) The steel manufacturer shall state the heat treatment recommended to give the physical properties specified.

(*e*) If the bars are furnished in the heat-treated condition, and the physical tests show that the heat treatment has not been correct, the bars may be retreated at the option of the purchaser.

WORKMANSHIP AND FINISH.—4. (*a*) The bars are to be sound, commercially straight, free from pipes, laps, cracks, twists, seams, and damaged ends, and are to have a workmanlike finish. They are to be uniform in quality, within the stipulated margins of manufacture, capable of being turned and threaded readily and of taking a good finish.

(*b*) Any article may be rejected because of injurious defects or faults in manufacture at any time, notwithstanding that it has previously passed the physical and chemical tests. it shall be returned to the manufacturer at the latter's expense. This clause shall not be taken to apply to materials fabricated after export.

PHYSICAL PROPERTIES AND TESTS.—5. (*a*) The bars shall have the following physical properties:—

Tensile Test.—(*b*) Minimum tensile strength, 150,000 lb. per sq. in. (105.45 kg./mm.²); minimum yield point, 115,000 lb. per sq. in. (80.85 kg./mm.²); minimum elongation in 2 in. (50.8 mm.) (or proportional gauge length), 14 per cent; minimum reduction of area, 45 per cent.

Impact Test.—(*c*) When impact-testing machines of the pendulum type are available, tests shall be carried out if required to determine the specific impact work of rupture in foot-pounds (or kilogram-metres). Results markedly lower than the average for this type of material will be sufficient cause for further investigation (or reheat treatment) of the material.

Selection of Test Specimens.—(*d*) Three bars of each size rolled from a heat shall be taken, and test pieces prepared in accordance with the I.A.S.B. standards. Each test piece and the bar from which it is cut shall be stamped with an identifying number. Should any of the test pieces, after being heat treated in the manner recommended by the steel manufacturer, fail to show the prescribed physical properties, new test pieces similarly indentified shall be made from the same three bars. At the option of the purchaser the steel manufacturer may recommend a different heat treatment for the second set of test specimens, and to that end he may make such tests as he desires from the remainder of the three bars taken for the tests. Should any of the three specimens taken for the final tests fail to show the required physical properties, the bars of that heat of the size represented by the specimens shall be rejected.

DIMENSIONS AND TOLERANCES.—6. The dimensions and tolerances shall be those given in the Specification 3S11.

DELIVERY, PACKING AND SHIPPING.—7. (*a*) The bars may be delivered in the annealed or in the heat-treated condition.

(*b*) The bars shall in general be grouped in bundles weighing not more than 250 lb. (113.4 kg.), unless otherwise agreed between manufacturer and purchaser. The heat number and the I.A.S.B. steel serial number shall be plainly marked on a metal tag attached to each bundle. If bars are not so grouped and bundled, each bar shall be plainly marked with the heat number and the I.A.S.B. steel serial number.

Chemical compositions of standard alloy steels.

NICKEL STEELS.

Number.	Carbon.	Manganese.	Phosphorus, maximum.	Sulphur, maximum.	Nickel.	Chromium.
2325	0.20–0.30	0.50–0.80	0.040	0.045	3.25–3.75	..
2330	0.25–0.35	0.50–0.80	0.040	0.045	3.25–3.75	..
2335	0.30–0.40	0.50–0.80	0.040	0.045	3.25–3.75	..

NICKEL-CHROMIUM STEELS.

3130	0.25–0.35	0.50–0.80	0.040	0.045	1.00–1.50	0.45–0.75
3135	0.30–0.40	0.50–0.80	0.040	0.045	1.00–1.50	0.45–0.75
3140	0.35–0.45	0.50–0.80	0.040	0.045	1.00–1.50	0.45–0.75
3230	0.25–0.35	0.30–0.60	0.040	0.045	1.50–2.00	0.90–1.25
3240	0.35–0.45	0.30–0.60	0.040	0.045	1.50–2.00	0.90–1.25
X3330	0.25–0.35	0.45–0.75	0.040	0.045	2.75–3.25	0.70–0.95
X3340	0.35–0.45	0.45–0.75	0.040	0.045	2.75–3.25	0.70–0.95
3330	0.25–0.35	0.30–0.60	0.040	0.045	3.25–3.75	1.25–1.75
3340	0.35–0.45	0.30–0.60	0.040	0.045	3.25–3.75	1.25–1.75
X3440	0.35–0.45	0.30–0.60	0.040	0.045	4.00–5.00	1.00–1.50

CHROMIUM VANADIUM STEELS.

					Chromium.	Vanadium, minimum.
6130	0.25–0.35	0.50–0.80	0.040	0.045	0.80–1.10	0.15
6140	0.35–0.45	0.50–0.80	0.040	0.045	0.80.1.10	0.15

When electric or crucible furnace steel is specified in the order the maximum allowable percentages of phosphorus and sulphur may, at the option of the purchaser, be limited to 0.03 per cent.

3S6—*Specifications for Alloy Steel Bars and Billets.*

(175,000 lb. per sq. in. Tensile Strength.).

GENERAL.—1. The general spedifications, 1G1, shall form, according to their applicability, a part of these specifications.

MATERIAL.—2. The material for these bars shall be chosen from among the I.A.S.B. standard alloy steels listed below. The composition chosen shall be stated by the manufacturer or contractor, and is further limited as follows: Carbon, not over 0.45 per cent.

MANUFACTURE.—3. (*a*) The steel shall be manufactured or at least finished by the open-hearth, electric furnace, or crucible process.

(*b*) A sufficient discard shall be made from each ingot to secure freedom from piping and undue segregation.

(*c*) The billets from which the bars are made are to be rough turned or chipped to remove all surface defects which might produce seams in the finished bar. No undercutting in chipping will be allowed.

Heat Treatment.—(*d*) The steel manufacturer shall state the heat treatment recommended to give the physical properties specified.

(*e*) If the bars are furnished in the heat-treated condition, and the physical tests show that the heat treatment has not been correct, the bars may be retreated at the option of the purchaser.

WORKMANSHIP AND FINISH.—4. (*a*) The bars are to be sound, commercially straight, free from pipes, laps, cracks, twists, seams, and damaged ends, and are to have a workmanlike finish. They are to be uniform in quality, within the stipulated margins of manufacture, capable of being turned and threaded readily and of taking a good finish.

(*b*) Any article may be rejected because of injurious defects or faults in manufacture at any time, notwithstanding that it has previously passed the physical and chemical tests; it shall be returned to the manufacturer at the latter's expense. This clause shall not be taken to apply to materials fabricated after export.

PHYSICAL PROPERTIES AND TESTS.—5. (*a*) The bars shall have the following physical properties:

Tensile Test.—(*b*) Minimum tensile strength, 175,000 lb. per sq. in. (123.03 kg./mm.^{2}); minimum yield point, 150,000 lb. per sq. in. (105.45 kg./mm.^{2}); minimum elongation in 2 in. (50.8 mm.) (or proportional gauge length), 12 per cent.; minimum reduction of area, 40 per cent.

Impact Test.—(*c*) When impact-testing machines of the pendulum type are available, tests shall be carried out if required to determine the specific impact work of rupture in foot-pounds (or kilogram metres). Results markedly lower than the average for this type of material will be sufficient cause for further investigation (or reheat treatment) of the material.

Selection of Test Specimens.—(*d*) Three bars of each size rolled from a heat shall be taken and test pieces prepared in accordance with the I.A.S.B. standards. Each test piece and the bar from which it is cut shall be stamped with an identifying number. Should any of the test pieces, after being heat treated in the manner recommended by the steel manufacturer, fail to show the prescribed physical properties, new test pieces similarly identified shall be made from the same three bars. At the option of the purchaser the steel manufacturer may recommend a different heat treatment for the second set of test specimens, and to that end he may make such tests as he desires from the remainder of the three bars taken for the tests. Should any of the three specimens taken for the final tests fail to show the required physical properties, the bars of that heat of the size represented by the specimens shall be rejected.

DIMENSIONS AND TOLERANCES.—6. The dimensions and tolerances shall be those given in the Specification 3S11.

DELIVERY, PACKING AND SHIPPING.—7. (*a*) The bars may be delivered in the annealed or in the heat-treated condition.

(*b*) The bars shall in general be grouped in bundles weighing not more than 250 lb. (113.4 kg.), unless otherwise agreed between manufacturer and purchaser; the heat number and the I.A.S.B. steel serial number shall be plainly marked on a metal tag attached to each bundle. If bars are not so grouped and bundled, each bar shall be plainly marked with the heat number and the I.A.S.B. steel serial number.

Chemical compositions of standard alloy steels.

NICKEL STEELS.

Number.	Carbon.	Manganese.	Phosphorus, maximum.	Sulphur, maximum.	Nickel.	Chromium.
2330 ..	0.25–0.35	0.50–0.80	0.040	0.045	3.25–3.75	..
2335 ..	0.30–0.40	0.50–0.80	0.040	0.045	3.25–3.75	..

NICKEL-CHROMIUM STEELS.

3135 ..	0.30–0.40	0.50–0.80	0.040	0.045	1.00–1.50	0.45–0.75
3230 ..	0.25–0.35	0.30–0.60	0.040	0.045	1.50–2.00	0.90–1.25
3240 ..	0.35–0.45	0.30–0.60	0.040	0.045	1.50–2.00	0.90–1.25
X3330	0.25–0.35	0.45–0.75	0.040	0.045	2.75–3.25	0.70–0.95
X3340	0.35–0.45	0.45–.075	0.040	0.045	2.75–3.25	0.70–0.90
3330 ..	0.35–0.35	0.30–0.60	0.040	0.045	3.25–3.75	1.25–1.75
3340 ..	0.35–0.45	0.30–0.60	0.040	0.045	3.25–3.75	1.25–1.75
X3440	0.35–0.45	0.30–0.60	0.040	0.045	4.00–5.00	1.00–1.50

CHROMIUM-VANADIUM STEELS.

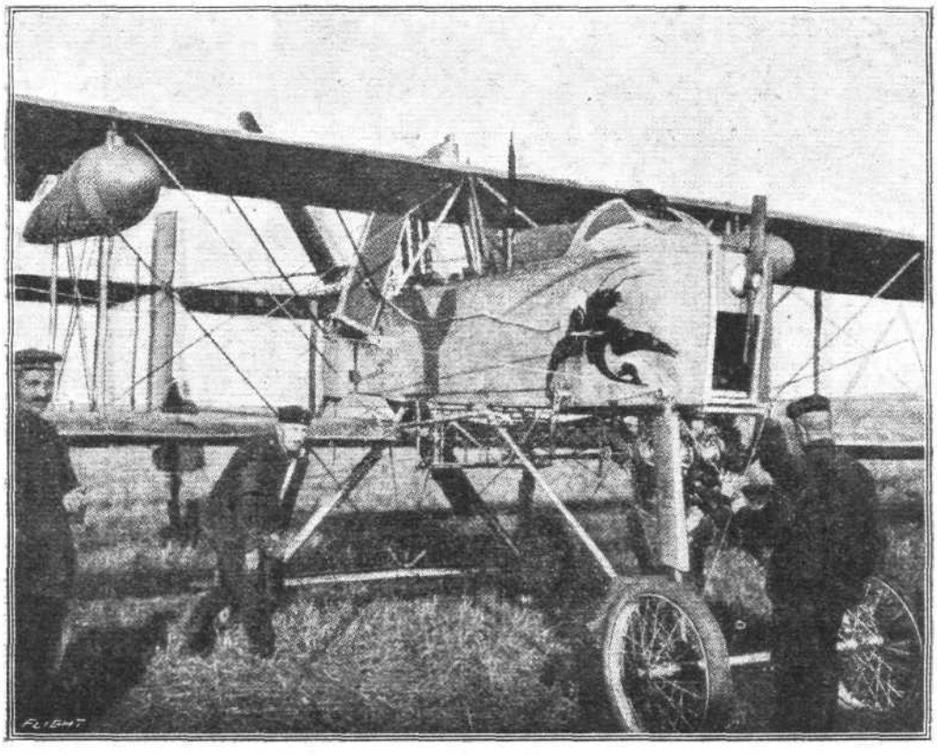
					Chromium.	Vanadium, minimum.
6130 ..	0.25–0.35	0.50–0.80	0.040	0.045	0.80–1.10	0.15
6140 ..	0.35–0.45	0.50–0.80	0.040	0.045	0.80–1.10	0.15

When electric or crucible furnace steel is specified in the order, the maximum allowable percentages of phosphorus and sulphur may, at the option of the purchaser, be limited to 0.03 per cent. (*To be continued.*)

Lord Northcliffe and Air Raid Burdens.

IN an interview with a representative of the *Thanet Advertiser* Lord Northcliffe expresses surprise that some of his neighbours have moved to London and other places. He added, "The losses of life owing to the German air and marine raids have been practically nil. When I was in America, to which I am returning, 995 people died of heat in New York City in one week alone. I did not hear of any inhabitants flying from New York, although there are plenty of cool places within reach. The vague *communiqués* referring to 'South-East England' make many people in London and elsewhere think that Thanet is the main centre of German attacks. Even if it were the centre it would not amount to very much. The real effect of these raids is to rouse Americans.

"As to the question of compensation for trade losses due to the German mosquitoes, Thanet bears a grossly unfair share of its burden of war, and should be handsomely recompensed by the rest of the United Kingdom. If I were not about to return to the United States I would take the matter up with the authorities."



In the Hands of the Enemy.—A French Voisin biplane captured by the Germans. Under the *nacelle* can be seen a bomb-rack and a search-light.

AIRISMS FROM THE FOUR WINDS.

COLONEL LORD MONTAGU OF BEAULIEU, C.S.I., we learn by cable, has just arrived in Canada, where he has gone to speak on aviation in some of the principal cities of the Dominion, with the object of stimulating interest in aerial matters, and more especially with a view to getting recruits for the R.F.C., both as regards officer-cadets and rank and file. At the conclusion of his mission Lord Montagu will proceed to India to resume his official duties there.

FOR all practical purposes the Air Force Bill passed the House of Lords intact as it came up from the Commons. Amongst minor mention, one amendment moved by the Earl of Crawford, stands out as defining without doubt an essential point in the scheme for one Air Service, contended for from the first by "FLIGHT." The wording of this new clause, which was accepted without opposition, sets out that the officers and airmen of a body of the Air Force acting with any body of His Majesty's military forces on active service, shall be made subject to military law, "and in such case they shall be subject thereto in like manner as if they were officers and airmen attached to the Army." This is a provision precedent as we have repeatedly pointed out, combined with a single uniform, to the smooth working of the single Air Service, and is on a similar footing under which soldiers, while on board ship, were brought within the scope of the Navy Discipline Act. Presumably under the latter, therefore, the necessity for making the Clause also applicable to the Royal Navy does not arise.

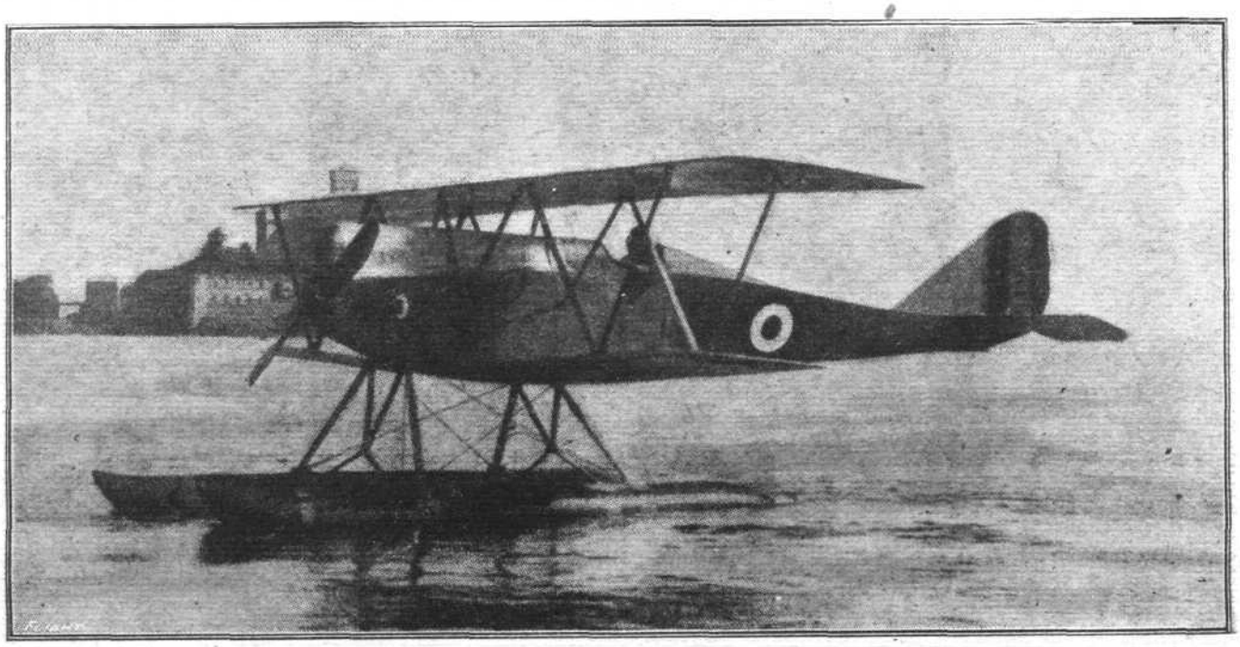
ONE of the first duties arising under the Air Force Bill is the selection of the new Air Council. This is already well in hand, and within a few days official announcement may well be made. Staff appointments and confirmations are also under consideration, one of the first to be noted being the appointment of Brigadier-General E. L. Ellington, R.A., to be Deputy Director-General of Military Aeronautics, the post held until recently by Major-General Brancker, who in October was appointed to "a command abroad." General Ellington originally commissioned in the R.A. in 1897, is one of the young progressive school, he being still under forty.

FRIDAY this week should be of more than passing interest to the aviation world. On that day the Prime Minister, at the invitation of the Benchers of Gray's Inn, will probably help to remove in his usual frank way, any phantom snags and sunken rocks which have been suggested as likely to make the smooth passage of the new organisation a hazardous experiment. There are so many misconceptions upon the details of the scheme, that authoritative enlightenment by Mr. Lloyd George, and the Air Minister, Lord Rothermere, who will also be present at Gray's Inn Hall, should go far to relieve the doubts of those who may have some misgivings upon the point.

OBVIOUSLY the Air-Raid Compensation Committee must have many a complex claim to investigate, now the Government have adopted, as from September 1st last, the principle of compensating for air-raid damage up to £500 per head, without having the further burden of retrospective claims to tackle. At the same time there must be many a case involving a more or less minor amount of compensation which it would be almost brutal to ignore, and therefore the Chancellor of the Exchequer is to be congratulated upon the Government's decision to put forward proposals which will enable adequate grants to be made in cases in which persons of comparatively small means are suffering substantial hardship, whatever may have been the date of the raid. We hope the interpretation of these powers will err on the generous side, rather than otherwise.

UNITED STATES ESTIMATES go still a step further in rendering expressions in millions and tens of millions a matter of no special concern. Still, £2,700,000,000 is a tidyish item to distribute in detail, even in wartime. What the United States Government thinks of the Aerial Arm is again emphasised, as no less a total than 307,000,000 *sterling*—not dollars—is ear-marked for the Army and Navy together. Of this £227,200,000 goes to the Army, to include the Signal Service, which not inappropriately is linked up with aviation, and the Navy takes £800,000. The Army item includes the original £128,000,000 allocated for the creation of the United States air fleet.

ABOUT time something were done to "standardise" air-raid warning lights in the Metropolitan District, and for the matter of that the country through. The absurdity and danger of the present haphazard Xmas tree methods would be ludicrous, were it not for the possible tragedies which may lurk behind the varied systems. We welcome therefore the step taken by the Southwark Borough Council who are asking



Courtesy "L'Aérophile."

The seaplane type tractor biplane, constructed by the Italian Société Gio Ansaldo.

the Home Office to fix uniform coloured lighting in London. As they point out at present in Bermondsey a green light is shown when all is clear and red denotes a warning. Elsewhere different coloured lights are used, while London County Council tramways display a green light for the warning.

AIR-RAIDISM is by degrees being recognised as part of necessary civilian work "at the front." In this connection the Secretary of the War Office has decided that when the relatives of civilians killed in enemy air raids so desire, arrangements may be made for the attendance of troops, with a band if one is available, at the funeral, and for the loan of a Union Jack to cover the coffin. Applications in such cases should be addressed to General Headquarters, Home Forces, Horse Guards, S.W. 1. Necessarily it must be understood that sanction can only be given if troops are available locally and if military exigencies permit of it.

A SERIOUS case of military damage of the greatest importance by the Hun raiders disclosed on Saturday last should help to hearten the instigators of this type of "civilised" warfare and encourage them to continue their city bombing practices. The case is that of Alice Price, 60 years of age, and an inmate of the Philanthropic Home for Women, Southwark, who being worried by air raids and having lost all her money except a penny, spent that penny on poison. The Huns, however, will be saddened to learn that fortunately the poison was not effective, and the Marylebone magistrate last week, before whom the old lady was bathed in tears, was able to put her in safety for a time by committing her for trial for attempted suicide.

A HUN point for consideration :—"Bread discovered in the Zeppelins which came to grief in France last month has been found, on expert examination, to consist of two kinds. The first sample of the baby-killers' loaves proved to be made of unmixed rye of precisely the kind ordinarily consumed on a considerable scale in Germany. The other sample was from a loaf made of wheaten flour containing an admixture of 10 to 12 per cent. of rice flour. The carbo-hydrates necessary to sustenance at high altitudes were furnished in the form of a thick layer of lard between slices of rye bread, while sandwiched between slices of the wheaten loaf was a generous portion of honey."—*Daily Chronicle* Office Window.

AVIATION after the war should be well cared for judging by the collection of men of affairs who are attached to and have been co-opted to sub-committees of that highly important body the Civil Aerial Transport Committee. The promised report should make fascinating reading, with such men of imagination in co-operation.

SYMPATHY will be generously accorded to Lord Rothermere, the Air Minister, who has received news that his eldest son, Captain the Hon. H. A. V. St. G. Harmsworth, Irish Guards, has been severely wounded for the third time. The gallant officer was born in 1894, and was educated at Eton and Oxford University. One of his brothers, Lieutenant the Hon. V. S. T. Harmsworth, Royal Naval Division, was killed in action last year.

SOUTH KENSINGTON MUSEUM is somewhat far afield from aviation centres, but with so few hotels left for absorption, it is not much to be wondered at that for Air Ministry purposes, this very beautiful building should have been ear-marked as a victim for the new Secretary of State's spreading tentacles.

TEN YEARS AGO.

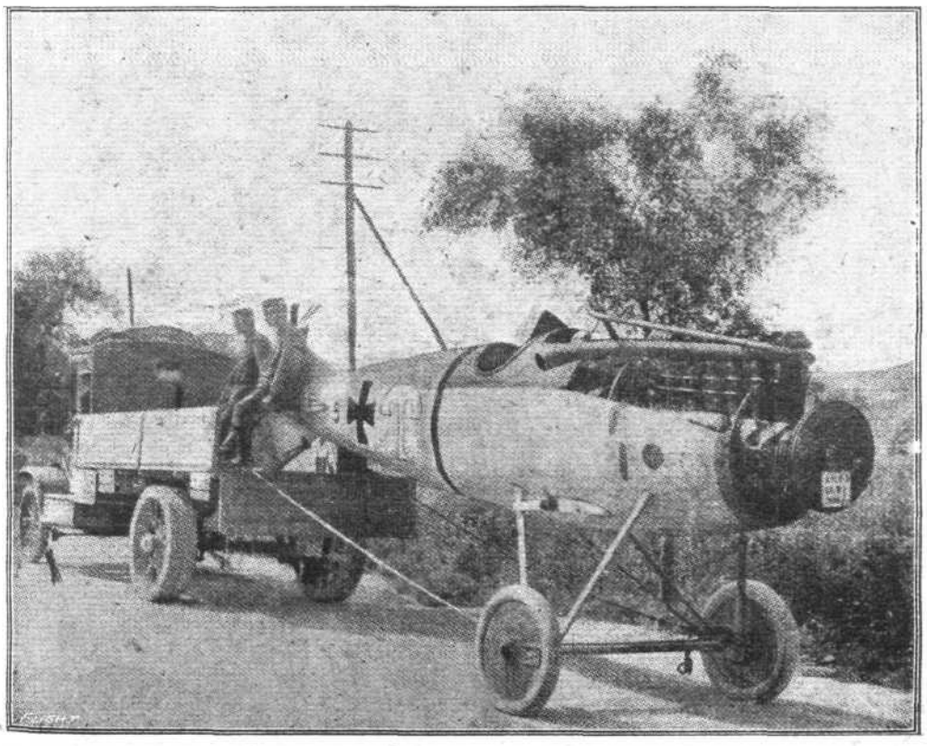
Excerpts from the "Auto." ("FLIGHT's" precursor and sister Journal) of November, 1907. "FLIGHT" was founded in 1908.

M. SANTOS DUMONT'S AEROPLANE "No. 19."

No doubt spurred on by the success attained by Mr. Henry Farman, M. Santos Dumont has temporarily abandoned his hydroplane experiments, and has been trying his latest aeroplane "No. 19," determined, if possible, to secure the Deutsch-Archdeacon Prize. In arrangement it follows the lines of a bird, having two outspread wings and a tail behind, while under the main body are two vertical and one horizontal plane. These are for steering purposes. The tail, which consists of two lozenge-shaped planes intersecting, can also be used for directing the machine, as it is mounted on a bamboo cardan-shaft, six metres in length, which can be moved in any direction. The two-bladed propeller is 1.35 metres in diameter, and is driven by a 2-cylinder opposed horizontal Dutiel and Chambers motor of 17–20 h.p., which only weighs 22 kilogs. complete. The framework is constructed of bamboo and metal, and the planes are made of silk, stretched on frames and varnished. The main wings are 5.1 metres from tip to tip, and are two metres in width. The weight of the complete machine is 56 kilogs. It is mounted on three wheels, two being in the front, splayed outwardly, so that should the apparatus strike the ground at an angle if would tend to right itself, while the third is at the rear.

"LA PATRIE" SAILS TO THE FRONTIER.

It has always been understood that "La Patrie" was intended to be stationed at Verdun, which is close to the Franco-German frontier, and now that the authorities in Paris have finished with her, she has duly taken up her new quarters. From Paris to Verdun is a distance of 150 miles or thereabouts, and this little trip "La Patrie" successfully accomplished without halt or hesitation on Saturday, November 23rd. Only 25 kilogs. of ballast were used, while the fuel consumption was 140 litres, or less than half of the supply on board. The engine on "La Patrie" was made by Panhards; it is of the four-cylinder type, and has a bore and a stroke of 170. mm.



Transporting a German aeroplane (Albatros) to the front.

Casualties.

Sub-Lieutenant BRYAN HENRY BRIDGE, R.N., reported missing on August 9th, is now presumed to have been killed. He was the only son of Mr. and Mrs. H. S. Bridge, of 20, Larpent Avenue, Putney, S.W., and was born in 1897. He was educated at St. Cyprian's College, Eastbourne, and Bradfield College, Berks, and on leavng the latter school in July, 1916, he joined the R.N.A.S.

Captain J. S. DE LISLE BUSH, Somerset L.I., attached R.F.C., who was reported missing on August 25th, is officially declared killed on that date, over the enemy lines, aged 21. Captain Bush received his commission in July, 1913, and went to the front with the regimental drafts in August, 1914. He was present at the battles of the Marne, Aisne, and Ypres in November, 1914, where he was severely wounded. He rejoined his regiment at the front early in 1915. He was transferred to the R.F.C. in 1916, and obtained his "Wings" last May. He was the youngest son of Mr. and Mrs. George de Lisle Bush, of Eastington Park, Gloucestershire, and was educated at Park Hill, Lyndhurst, and Cheltenham College.

Lieutenant ALEXANDER C. N. MARCH PHILLIPPS DE LISLE, R.F.C., was killed while flying on November 20th, in his 21st year. He volunteered for service at the beginning of the war, and obtained a commission in the Leicester Regiment when he was 17 years old. He went to France in June, 1915, and returned home, having been wounded in a bombing raid at Bienvillers. He was recommended for gallant and distinguished conduct in the field by his divisional commander. He returned to the front in June, 1916, and was severely wounded in the neck on July 14th while leading a bayonet charge in command of his company. In December he joined the R.F.C., and gained his wings last July. He went to the front again in August. Lieutenant de Lisle was the fifth and youngest son of Mr. Edwin de Lisle, M.P. for Mid-Leicestershire, 1886-92, and grandson of Mr. Adrian Elias Hope, and was educated by the Jesuit Fathers at Beaumont College, Old Windsor. Two of his brothers have been invalided during the war—Rudolph, lieutenant, R.N., of H.M.S. "Invincible," and Lancelot, 60th Royal Rifles. Two other brothers are serving in the Army, one in England and the other in India.

Flight-Lieutenant EDMUND BOURCHIER DEVEREUX, R.N.A.S., who has been killed in action, was the eldest surviving son of Mr. and Mrs. W. de L. Devereux, of Great Shelford, Cambs. Educated at Victoria College, Jersey, and at Osborne and Dartmouth Colleges, he served in His Majesty's ships "Warrior" and "Agincourt," and was present in the latter at the Battle of Jutland. In January of the present year he answered to the call of the Admiralty for volunteers for the R.N.A.S., and met his death while on patrol duty in the North Sea. Lieutenant Devereux's elder brother, Humphrey William Devereux, Lieutenant, South Staffordshire Regiment, was killed in Flanders in June, 1916, and his only surviving brother is serving with his regiment in the East at the present time.

Lieutenant ERIC CUTHBERT JOHN ELLIOTT, Essex Regiment, attached R.F.C., who was killed in action on November 22nd, was the youngest son of Mr. and Mrs. Clifford Elliott, Beulah Hall, Clapham Park, and Smyrna, Turkey.

Second Lieutenant W. GODFREY HEATHCOTE, R.F.C., killed on November 23rd, aged 19, was the elder son of Mr. and Mrs. Godfrey Heathcote, of Arnside, Westmorland, and was educated at The Wells House, Malvern Wells, and at Blundell's School. He received his commission last May and had been at the front since September 5th.

Flight Commander PHILLIP A. JOHNSTON, R.N., who was killed through collision in air battle on August 17th, aged 19, was the only son of Mrs. E. Johnston, London, and the late A. Johnston, M.E., Gundagai, grandson of the late Dr. Robert G. Johnston, Monahan, Ireland, and the late Phillip Davies, Consulting Mining Engineer, Sydney.

News has just been received that Lieutenant ERIC STUART LIVOCK, of the Queen's and R.F.C., youngest son of the late Mr. H. A. Livock and of Mrs. Livock, of 31, Broom Water, Teddington, has been killed in action. The officer, who was 22 years of age, joined the colours at the commencement of the war, and received his commission in September, 1915, He proceeded to France in July last, and fell some three weeks later, on his return to the front after his first leave in October.

Second Lieutenant H. NEVILLE S. SKEFFINGTON, R.F.C., who is now presumed officially to have been killed over the German lines in July last, was the second son of Mr. Martin S. Skeffington, Leinster Mansions, Hampstead, and Southampton Street, Strand. He was 33 years of age, educated at Charterhouse, and was associated for some years with the publishing firm of Skeffington and Son. Afterwards he spent some time in the Colonies, and landed at Brisbane two days before the outbreak of war. Enlisting at once in the Australian Field Engineers, he subsequently served with the Australian Forces in Egypt, Gallipoli, and later in France, where he received his commission.

Second Lieutenant EDWARD STANLEY, R.F.C., of 167, Willesden Lane, N.W., who was killed in action on November 22nd, aged 20, was the youngest son of Samuel and Louise Weiss.

Flight Sub-Lieutenant GEOFFREY SMITH, R.N., killed whilst flying in France on November 24th, aged 18, was the eldest son of Mr. and Mrs. G. W. Smith, of Derby Road, Caversham, Oxon, manager of the Reading branch of Barclay's Bank. He was educated at Marlborough House School, Reading, and Marlborough College, and joined the R.N.A.S. from the college O.T.C. on attaining the age of 18 last May. He was gazetted in September, and proved himself a skilful pilot. Sub-Lieutenant Smith was a prefect of Marlborough, where he was studying for the engineering profession. He was a good all-round athlete, and gained his school colours for football and hockey last winter.

Lieutenant B. WYNFORD PHILIPPS, R.F.C., second son of the Rev. D. Philipps, of Newport, Salop, who was accidentally killed while flying in Yorkshire on November 14th, was educated at the Congregational School, Caterham, and the Grammar School, at Newport, Salop. At the outbreak of war he was a medical student at the London Hospital, and intended becoming a medical missionary. He was an all-round athlete, and captained the London Hospital eleven.

Married.

The marriage of Lieutenant FREDERICK WALTER CRAWFORD, Princess Patricia's Canadian Light Infantry and R.F.C., and Miss FANNY HAYWARD FIRRELL, second daughter of Mr. James Firrell and the late Mrs. Firrell, of Broad Oak, Brede, took place on December 1st at Mount Pleasant Congregational Church, Tunbridge Wells.

On November 24th at the Church of the Holy Innocents, South Norwood, S.E., Captain J. DOUGLAS DRYSDALE, R.F.C., eldest son of Mr. and Mrs. J. W. Drysdale, of South Norwood Hill, S.E., was married to IVY, youngest daughter of Mr. and Mrs. R. W. MITCHELL, of Weighton Road, Anerley, S.E.

On December 1st, at Uxbridge Providence Church, RICHARD SLOLEY, A.S.C., attached R.F.C., second son of Mr. and Mrs. O. J. Sloley, of Ealing, was married to DOROTHY ELVEN CUFF, only child of Mr. and Mrs. JAMES DEARBERG, of Hayes, Middlesex.

To be Married.

The marriage of Lieutenant W. A. BARTLETT, Lincolnshire Regiment and R.F.C., and FRANCES MARY, daughter of Mr. and Mrs. DAVIS, Holly House, Goudhurst, will take place quietly in London early this month.

A marriage will take place shortly at Petersfield between Lieutenant ERIC COPNER, the Devonshire Regiment and R.F.C., only surviving son of the late Arthur L. Copner, and PAULA, daughter of the late Maître FLORIZOONE, barrister, of Bruges.

The engagement is announced of Captain FRANCIS JUSTIN MILLER, R.F.C., second son of Mr. and Mrs. A. P. Miller, of Stone, Staffs., and DOROTHY MARGARET, second daughter of the Rev. and Mrs. A. E. DAMS, the Vicarage, Goring-on-Thames.

FLIGHT
& AIRCRAFT ENGINEER

DOPPLER'S PRINCIPLE.

By N. BACK, B.A. (Cantab.), Lieutenant R.F.A. (T.).

A CLEAR explanation of this principle has been given by S. T. G. Andrews in connection with the change in pitch of the note of an aeroplane. The formula obtained, however, applies only to an observer who has managed to get in the way of an aeroplane, whose observations, assuming even they were fit for publication, would not be very reliable.

In short, the aeroplane is in the air and the observer on the ground, and there will always be distance between them even when they are at their nearest points to one another. Only when an aeroplane is at an infinite distance will the sound waves reach the observer with the velocity of sound plus the velocity of the plane approaching, or minus the velocity of the plane receding.

Diagram 1.—Let the speed of the plane be 80 miles per hour (roughly 100 feet per second).

ON is the height of the plane, A, B, C, . . . give the positions of the plane at successive intervals of a second. AB = BC = . . . therefore give the velocity of the plane in feet per second.

OA is the distance of the plane from the observer at the start, ON the distance after eight seconds. AP, BQ, CR . . . give the spaces described towards the observer, in successive seconds.

It will be seen that these are all less than 100 feet and moreover *get progressively less.*

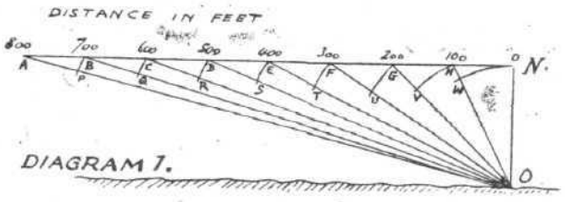


DIAGRAM 1.

In other words the plane *approaches at a decreasing* rate, until at N it has ceased to approach at all, when it then begins to *recede at an increasing* rate.

Diagram 2.—Along the horizontal axis is set off distance measured along the ground from the observer. Along the vertical axis is set off the velocity of the plane towards or away from the observer (*i.e.*, along the " line of sight ").

Four graphs are drawn for the same plane at different heights. In each graph the velocity decreases to zero when the plane is overhead—where the note heard is the true note of the plane, it then becomes minus. The velocity also tends towards 80 miles per hour as the distance gets greater.

No. 1 graph is hypothetical and shows the note changing *instantaneously* from high, through true, to low, *à la* M. Doppler.

No. 4 graph shows a nearly uniform descent in pitch. Graphs intermediate between 1 and 4 give intermediate effects. These graphs apply to planes not passing directly overhead, if the height is measured obliquely.

It will be seen that for planes most easily heard—those

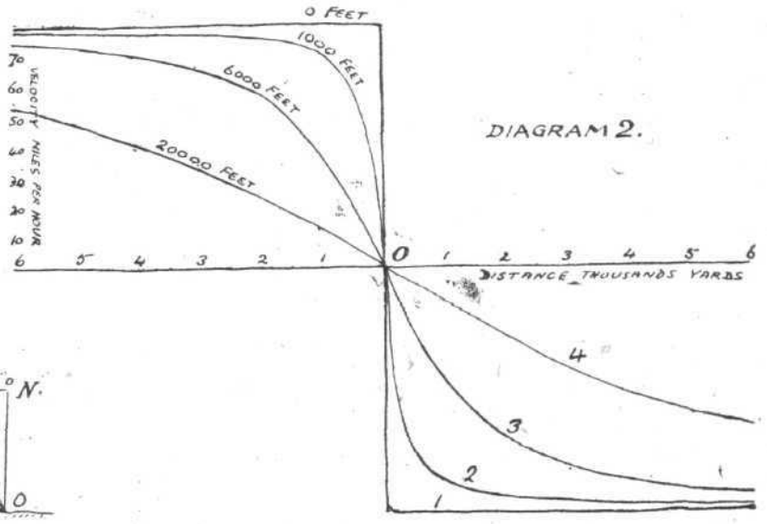


DIAGRAM 2.

flying below 6,000 ft.—the fall of the note will be most marked when the plane is within 2,000 yards of the observer. In conclusion it is insisted, that only when the actual velocity of the plane through the air is rapidly increasing, and the plane is diving along the line of sight, could the note ever be heard to *rise.*

[N.B.—Wind would only serve to increase or decrease the 80 miles per hour by a *constant* amount.]

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THE WORK OF THE R.N.A.S.

A FEW particulars are now available relating to the work which naval aircraft performed during the month of September. The total distance covered by the patrols was over 170,000 miles, of which 90,000 miles was covered by seaplanes and 80,000 miles by airships. On seven occasions ships, which were being attacked by submarines, sent S.O.S. signals, which brought seaplanes to their assistance in time to save them by compelling the submarines to dive. Several hundreds of ships were convoyed during the month by aircraft, and in no single instance has a submarine dared attack a ship while under aircraft escort. The number of submarines attacked and destroyed by our aircraft cannot be published, but a few words may be said as to the method of attack. When a destroyer sights a submarine some five or six miles away he goes full speed to the attack at about thirty miles an hour, so that the submarine has ten minutes or so in which to dive beyond the reach of the destroyer's depth charges. But when a seaplane sights a submarine at the same distance he flies to the attack at anything from 80 to 100 miles an hour, so that the submarine has only three or four minutes before bombs begin to fall round her. It is not suggested that destroyers have been superseded by the seaplanes as the enemy of submarines. On the contrary, the two very often work together, and their co-operation usually spells disaster for the " U "-boat.

A seaplane recently sighted a German submarine on the surface, flew directly over her before she had a chance to dive, and dropped a bomb on her tail, which was seen to make a large hole in the deck. Immediately afterwards the seaplane pilot saw through the mist three more German submarines, in line abreast, followed by three German destroyers and escorted by two German seaplanes. All six vessels fired their anti-aircraft guns at our seaplane, but the German seaplanes did not attack, because they could not get through the barrage put up by the fire of their own destroyers and submarines. Our seaplane turned, dropped another bomb on the wounded submarine, saw her sink amidst a pool of oil, in which fragments of her floated, and then retired from an unequal contest, at the same time sending a wireless message as to where three of the enemy's destroyers were to be found.

The mere presence of the seaplane has many times saved a merchant ship when a submarine has been attacking it. Moreover, when the tragedy has actually occurred and the torpedo has found its mark, it is the seaplane which is the first to see the shipwrecked crews in their boats, to send wireless messages for assistance and to direct the rescuers to the right spot. It is the seaplanes and the other aircraft which first sight the deadly mine, and so help the minesweepers in their task. In a word, it is the naval aircraft which has been, and is, saving the lives not only of those who traverse the seas but of every man, woman, and child in the British Isles, who would otherwise be threatened with starvation. Without a constant stream of new aircraft to replace the inevitable heavy wastage in machines, the struggle against the German submarines will be prolonged, food will become dearer, and last but not least, the lives of our sailors will be needlessly lost.

COMMERCIAL AERONAUTICS.*

By Lieut.-Colonel MERVYN O'GORMAN, C.B., D.Sc.

Aerial Transport and Travel.—There is talk to-day of aircraft for transport and travel. The carriage of goods, mails, and people, the exploration of remote districts, the conduct of photographic surveys, the searching out of valuable trees in pathless forests, the speedy conveyance of officials to their administrations in distant climes—these things and others are everywhere hopefully dwelt on by the imaginative among those engaged in air work. It would be grossly unjust to say that such hopes and fancies detract from the energies which these persons expend on their war duties; they rather indicate the intention of winning and of carrying on thereafter the life of a virile community.

In a paper before the Aeronautical Society, in June this year, I gave reasons to show that in the interest of the war we must care about the future of transport by aircraft. I will recapitulate the position under A, B and C, for there are three stages in the logic of the matter:—

A. We are to have an Air Ministry and an Air Force; the Act shows that they are not temporary—a token from which alone we may say that we intend to have a fighting Air Fleet.

B. An air fleet differs from a sea fleet in being much more easily expendible. No one would dream of rebuilding the British High Seas Fleet six or eight times per year of war, but an air fleet in action requires, and will continue to require, at least this. Thus the aeroplane has in this context the interesting singularity of being intermediate between a cartridge and a battleship. It is not quite so rapidly expendible as the former, but it is an expendible munition, and when we decide to have an air fleet we also decide, in logic, on the third conclusion, C.

C. This corollary is that we will maintain an aircraft construction organisation in peace that shall be competent to produce some six or eight air fleets per annum in war.

At present we have such an industry—not large enough, perhaps, but we have at least a live and flourishing plant which is bearing fruit, which can grow, and which, be it noted, can also expire. A living organism can be killed by deprival of oxygen. In three minutes a man is drowned, and 40 years' training of brain and hand can be thus quickly reduced to an inert mass. Similarly rapid is the rate of disintegration of a highly organised technical production department like the aircraft industry if it be starved. To-day war orders continue at full flood to fill up the wastage. If they stop suddenly we shall find within three months that the shop organisations are broken up, that all that remains to us is the husk; we shall realise that we could, by timely measures, have saved much of our expensively purchased experience and organisation, and have retained a value far greater than the mere buildings and plant. Once the designers and workmen are scattered, that which is so difficult and expensive to build up will be gone. Our capacity for the production of aircraft will be an object of derision like a bouquet of hairs in an old broom.

This simile will have succeeded if it has led a few score of persons to inquire, "What on earth are we to do to keep this mechanism of production in being without keeping up in peace the war rate of expenditure?" A part of the answer was outlined in my first sentence; we must so utilise aircraft on commercial duty, and so nurse it in its days of trouble, that it shall itself earn the best part of its keep.

If aircraft using can be induced to pay, aircraft making will of itself continue. But, in spite of the firmest belief in the value of aerial travel, the mere institution of services takes time. Neither three months, nor six months, nor a year, will see a thriving mercantile air fleet engaged on its routine duties and issuing its routine orders on which the construction business depends. Yet a less period of inaction than this will extinguish the industry. This is the period I ventured to call the "hiatus" in the discussion on Mr. Holt Thomas's historic lecture last May. To bridge the hiatus we must do something *now*. There is no other alternative. No one expects a continued unrequited expenditure of from £25,000,000 to £50,000,000 per annum on aerial war material in peace time. On the other hand, no one would object to our making even this large amount of aircraft if it nearly earned its keep by remunerative services in any of the travel and transport businesses, or even if we could be assured that, after a period of Government support, it would eventually draw near to the standing of a self-supporting industry.

If we look back to the birth of the railway and the steamboat we see that for some years they struggled against public apathy—though their potentiality for good and for the creation of wealth and trade was almost as great in Watt's time as now. In the case of the road vehicle, which we now call a motor-car, we had something worse than apathy—we had legislation for the alleged protection of the public, all meant in kindness—which killed the motor-car of 1837 and retarded the car of 1892, till France was well ahead of us. In the case of dynamo electricity we underwent a process of protective legislation against shock and fire possibilities, which threw us well behind Germany and the United States. The story of legal impediments to scientific advance makes one wonder whether we are a free people—that is, with freedom to advance, or are we only set on freedom to stagnate?

The greatest danger that aircraft has to fear, after public apathy, is legislative interference. It is not that the British law, excepting only when it is panicky, is worse made or more malignantly administered than another. The kindly intentions of legislation towards the public are generally as laudable as our laws in technical matters are detrimental. Yet such a community as ours can only live and thrive on its technicians. Of legislation relating to aerial transport it may safely be said that it is a case requiring the greatest delicacy of handling. It must be taken as certain that Government assistance, I do *not* say subsidies, for the industry must be forthcoming unless it is doomed, but even if this assistance were certain there remains cause for anxious thought to-day.

The danger of Government support lies in the conditions which a self-protective public is liable to impose before the technical possibilities are sufficiently known to form the basis for any sort of legislative interference. To-day we may safely say that £50,000,000 worth of air-craft is yearly poured out from this country's factories. The large majority of this is flown to its destination, or used for tuition and defence at home, yet we still see the sun.

Now there is no prospect for many a long day of any such £50,000,000 output on commercial aerial transport. It is merely necessary to recall that our total expenditure on merchant shipping is a mere fraction of this to see the absurdity of apprehending and legislating as if we were to have this immense user of aircraft. There is not the slightest probability of any nuisance in excess of what little we suffer to-day, even if we had, which I see we shall not have, an aerial fleet of this magnitude.

I have indicated the need for restraint in law making, but there is also need for positive official action, if the bells that ring in peace are not to sound the knell of aerial activity. The Allies must, during the war, frame a joint policy as to the tolerance of each other's trader and postal aircraft, and agree to air routes throughout the parts of the world which they control. With the large expanse of our colonies and our own industrial and postal importance, we have much to offer to the Allies which will be a valued equivalent for that which we shall obtain from them in the way of alighting rights. Being an island, and accepting, as we must accept, the proposition that the most significant section of aerial transport will be outside the confines of Britain, we need that our Allied neighbours shall extend, not only tolerance, but welcome to our machines when engaged on their transport work.

International agreements, even though simple in subject-matter and non-controversial, are always long drawn out. Everyone who understands factory organisation will agree that we cannot afford to wait until after the war for these parleyings to begin. Our aeronautical organism will assuredly become disintegrated too quickly. If we can get four or five willing men round a table to agree to admit aircraft mutually, to register them, to agree to simple preliminary rules of the road, and to agree that their respective countries should initiate a few lines of landing-grounds so as to constitute safe routes, the early days of trade flying have little more to ask for from the Foreign Offices of the world.

No doubt in some four or five years of active aerial transport organisation work the paltry fifty or hundred aeroplanes of our early post-war efforts at transport travel will have grown up into a significant carrying trade for high-speed work, large quantities of aircraft will have been used for commercial purposes, and it will be found useful to introduce, and there will be experience enabling us effectively to introduce, valuable regulations for the protection of passengers in aircraft, and the public on the ground beneath. At the present day it is clear to all who have eyes to see that no adequate knowledge exists on which to frame rules with discrimination and without grievously hampering technical development.

* Abstract of a lecture delivered before the Royal Society of Arts on November 28th.

I can imagine a legislator winning a round of applause from the *inane vulgus* by driving a hard bargain with the wretched trader, who, in the face of starvation, might accept any regulations, however hampering, in exchange for the means to live. I can imagine the imposition of tests of airworthiness, strength tests, the enforcement of hobbies such as multiple engines, silencers, special alighting gears, the carrying of parachutes, fire extinguishers, wireless equipment for calling for aid, and countless other things, which may, no doubt, come in their own time, but which would clog the versatility of the engineer, and for years condemn to unproductiveness the nascent industry of air travel. The payment of an army of inspectors would be put down as encouragement money, and would be a charge against the aeronautical vote. A landowner would ask for the power to capture the flyer who has most reluctantly alighted on his ground. He might ask for a law allowing him to impound the aeroplane, on the chance of his registered number being inauthentic, and so secure payment of the damages which he wishes to claim.

Let us rest assured that the amount of civil aircraft will for some years be so much less than the amount of military aircraft now existing, that the total of damage to property and inconvenience to the public, which we at present know to be small, will be much further reduced in proportion to the lesser numbers, the future technical advances, and the less strenuous conditions of manœuvring imposed on peace aeroplanes.

Labour.—Among the expectations based on aerial transport and travel, are those of employment for individuals throughout the whole social scale as well as officers and men from the Army and Navy. Our producers, and therefore their employment of labour, depend on the bodies which employ aircraft, viz.: (*a*) Primarily the Air Force; (*b*) foreign buyers, nations and colonies; and (*c*) companies instituted for transport and travel, including postal duties. All these bodies need labour, and all are interested in continuing harmonious relations between those who direct the work and those who manually carry it out.

It has been suggested that since the aircraft industry is a new industry, an exceptional opportunity exists of introducing a totally new atmosphere of harmony unembittered by the old trade quarrels. This is most desirable, but the novelty of the technics of aircraft has not *in fact* eliminated the old trades at all; on the contrary, it has developed the demand for these "tradesmen." The aircraft industry is not a new trade in the sense in which that word is used by the world of labour in the phrase "Trades Union." The aircraft industrry includes members of almost all the engineering trades, as well as important additional trades, such as woodworkers, carpenters, organ builders, cabinet makers, fabric workers, &c., and it is necessary for that harmonious relationship to be established between employer and employee, in spite of the fact that the history of all the old trade differences will unavoidably be also the history of the persons and corporate bodies imported into the new industry, with this addition, that a trade quarrel on the subject of organ pipes or on the piece-work price of chairs, may mean a stoppage of aeroplane work, owing to the newly imported craftsmen holding on to the old unions.

Again, it would be unintelligent to pretend that aircraft making can be developed under a compact between employees and managers which shall guarantee continuity of employment for all the manual workers in exchange for a continuity of labour supply to the other. The difficulty is a fundamental one, and perhaps is a worse difficulty in the aircraft industry than in most others. It is this. The technical developments of the art, the unforeseeable shortages of material, and the unavoidable changes of methods and materials, tend, let us say, at one time to the employment in an aircraft factory of 50 per cent. of wood workers and 30 per cent. of steel workers, and there is no human authority who can with sanity pretend to say that in some brief time these proportions will, or will not, be widely changed. If steel or aluminium were to form a greater part of the structure than they do now, because of safety, or diminished fire risk, or what not, any agreement with the wood workers' union for continuity of their employment would install them as a paid but non-working body of pensioners on the industry. Alternatively, British aircraft, hampered by such an agreement, would remain locked in its old technical groove and be debarred from adopting the devices and inventions which throughout the rest of the world would be improving the machine. Surely a hopeless prospect for a technical service required for war!

It is clear, then, that the agreements between manual and brain workers on aircraft must be part of the general agreement on which our new millennium is to be based.

Accidents.—It is unfortunate that the chief contact which the public of England makes with aeronautics is in relation to accidents and casualties. The achievements appear, it is true, but it is almost impossible to visualise them save perhaps in the case of an occasional flight of unusual distance, such as the recent 3,000-mile flight from London to Constantinople, or between London and Turin, and these things appear to be disconnected items giving no impression of the hundreds and thousands of miles of continual flying which is taking place. These show flights are few, not because they cannot be frequently achieved, but because war does not provide for show and *réclame*. The public cannot by a mere lecture be brought to the point of view which is standard with those who have been really familiar with aircraft; we are so imbued with its utility and versatility, that we are no more discountenanced by occasional breakages than we are deflected from hiring a taxi by seeing a sideslip against the kerb. Those actually engaged in design, who naturally need to use every element of experience which accidents may bring to enable them to perfect their work, are anxious to study and analyse these occurrences.

Air accidents can be divided into groups for the purpose of their study, and when we proceed so to divide them we find that by far the largest category includes those which are due to the two following circumstances: (1) The absence of landing-grounds distributed in easy stages to which a flyer can turn for refuge, if his engine should stop; (2) the inexperience of flyers themselves, since the majority of the experienced have been drawn off to the war. If we remove from the records of accidents, other than tuitional, all those which could have been avoided were these causes non-existent, the residue would be less significant in *fact*, and vastly less significant than is the *impression* abroad. Beyond this it is still reasonable and advantageous to sub-divide the causes of this residue of accidents into classes, so that attention should be drawn to that which may be eliminated, be it in design or in handling.

Of the remainder, the most important is what is commonly called "Pilot's error." This does not imply that he is blameworthy. In war, manœuvres which are definitely hazardous are necessary; people may be surprised to hear that to loop the loop is a useful war manœuvre which may greatly puzzle an antagonist in the air, since the looped path takes the place of the expected forward movement, and therefore falsifies the aim of the adversary, or throws out all his estimate of the direction in which to fly for purposes of intercepting him. Another manœuvre, known as "spiralling," or "spinning," if contrived to give the impression that the aeroplane has in fact been thrown out of control, is one of many ruses for breaking off a fight. The learning of these manœuvres must be achieved before they can be used in war, and tends to swell the number of broken machines. Rapid diving, such as might be made in an attack on observation balloons, may similarly be a cause of accident until judgment is acquired in the method of "flattening" out of the dive. Even to describe a *very* small circle in a horizontal plane implies unusual stress on an aeroplane, if accomplished at high speed. None of these manœuvres are called for in trader work, while, to add to the comparative safety of the peace aircraft, we can appreciate the effect of removing the war demand for high performance and speed. Under fire and pursuit safety comes from lightness and manœuvrability, as much as and more than it does from strength and solidity: in trader work the conditions are largely changed if not reversed.

Aircraft travel and transport therefore will, if landing-grounds are provided, not be exposed to any of the risks above named, and accordingly from the list of accidents which occur to-day we must eliminate almost all these in any prognostication as to the future safety of flying.

Much need not be made of the fire dangers on aircraft, for when the matter is regarded dispassionately, the fire risk by actual experience is small. Of the fires which have occurred since thousands of aeroplanes have been turned out per month, the large majority have arisen when the aeroplane has struck the ground and the petrol vapour from the broken-up tanks has come into contact with a spark. Now this breaking-up of a machine on the occasion of a forced landing again becomes a rare occurrence if the line of landing-grounds suggested for aerial routes is provided. Most of these smashes, some fraction of which have resulted in fires, have occurred by reason of the flyer holding up his machine unduly long in his search for a suitable place to alight in a country where no provision for alighting exists.

Of the mechanical precautions taken to avoid fire, we know

that already it has been possible to make a magneto which when filled with explosive vapour and surrounded by it, gives rise to no ignition of the mixture. We have also learnt that the back-firing or "popping" of an engine into the induction pipe which throws a flame back can be made innocuous by drawing the air supply of the engine from outside the body work. This, indeed, is standard practice to-day. The use of electrically heated clothes, called for by fighting at heights such as 20,000 ft. will not be normally desirable, and as for appliances for wireless telegraphy, which will have their place for giving trader craft their direction and for calling to the ground, they will not, under peace conditions, impose any risk of fire which cannot be circumvented. In general, the standard of safety from this point of view will be automatically enhanced in all transport work. Carelessness, such as makes people bring matches into a T.N.T. factory, cannot be expunged from the human race, but this class of occurrence need not disconcert us at all. In filling up with petrol there is the chance of spillages, and no doubt but that every aerodrome should be equipped with portable fire-extinguishers of light weight made available at filling points, and no doubt also but that all larger aeroplanes will carry one in an accessible position, until the proved absence of utility causes them to be relinquished.

The accident, if it can be so called, of losing one's way in a fog will be far less likely to result in disaster, when, to quote it once more, there exists a multiplicity of landing-grounds, because, on the one hand, no fog has been found to extend more than a very limited height, say, 700 yards maximum, and, on the other hand, because we now know that fogs are quite local in their occurrence at any one moment. A befogged flyer, instead of alighting through a foggy patch, merely moves a little further on before landing. This does not imply that projects for signifying to a flyer who is above the fog the correct position of his aerodrome by pilot balloon or raised lights are to be discarded, but this is not the place to deal with that point.

Parachutes are spoken of, but by many flyers are not thought particularly desirable. We know that at present they require a height of some 500 ft. to open out and afford the safety which they appear to offer,* and it is usually below these levels that the flyer becomes convinced he is to be exposed to some risks, say, by the conditions of the ground together with the stopping of his engine which causes him to alight. One would have to be very seriously out of touch with those who fly daily and really know their job, if one continued in the impression that numbers of accidents are the inevitable concomitant of aerial travel, and it is sufficient to say that any such opinion may be dismissed as one which has arisen from the peculiar conditions of press publicity in war and the exclusively high pressure and high performance conditions of the development of aeronautics up to to-day. The lack of contact of the public with the serious and successful work which has been achieved has already been mentioned.

(To be continued.)

* [How about the "Guardian Angel" parachute?—ED.]

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

British.

General Headquarters, November 21st.

"On the 20th inst. our aeroplanes attempted to work throughout the day in conjunction with our operations between St. Quentin and the River Scarpe. Low clouds and mist and a strong westerly wind, with drizzle and occasional rain throughout the day, made it necessary for our pilots to fly at 50 ft. from the ground. Even at that height they were at times quickly lost in the mist. Continual attempts were made to maintain contact with our advancing troops, but this was rendered almost impossible by the weather conditions. Many bombs were dropped on the enemy's batteries, lorries, aerodromes, transport and railways. Batteries and small groups of infantry were attacked with machine-gun fire. Valuable information was gained, despite the very difficult conditions. Only five hostile machines were seen all day on the battle front. Eleven of our machines are missing, their loss being due to the mist and the exceptionally low height at which they were compelled to fly."

General Headquarters, November 22nd.

"Further details received show that the attacks made on the 20th inst. on the enemy's infantry and transport by our low-flying pilots, including pilots from the Australian Squadrons, were most successful. On the 21st inst. the weather was even more unsuitable for flying than on the previous day, but a number of successful reconnaissances of the enemy's lines of communication were carried out, and every endeavour was made to keep in touch with our infantry. No enemy aeroplanes were encountered, and none of ours are missing."

General Headquarters, November 23rd.

"On the 22nd inst. the bad weather continued, preventing all flying except at a very low height. Our aeroplanes were very active in attacking hostile troops and transport on roads in the neighbourhood of Cambrai with bombs and machine-gun fire. A number of fights took place with the enemy's low-flying machines, three of which were brought down, while two others were driven down out of control. One hostile balloon also was brought down in flames. Five of our aeroplanes are missing."

War Office, November 23rd.

"*Salonica.*—Bombing raids have been carried out against Tusculu (west of Demirhissar) Ernekeui (south-west of Demirhissar), and Veznik (east of Seres). The Royal Naval Air Service shot down a hostile aeroplane, which crashed behind the enemy's lines. Another machine which attempted to attack one of our balloons was brought down behind our lines, the pilot being killed."

Admiralty, November 24th.

"On November 23rd, in the course of fighter patrols by the Royal Naval Air Service, two enemy aircraft were probably destroyed and one driven down completely out of control. On November 20th, also, one enemy machine was destroyed. All our machines have returned safely."

General Headquarters, November 24th.

"On the 23rd inst. our aeroplanes co-operated with our infantry in their attacks, flying up and down the lines of our advancing troops at a low level, and helping with machine-gun fire to disperse the enemy's infantry. Hostile reinforcements and transports on the road were also attacked, and many bombs were dropped behind the battle front on important railway junctions at which rolling stock was collected and detraining in progress. Australian squadrons again took part in this work, which was carried out continuously throughout the day, although the weather at times made flying almost impossible. The enemy's aeroplanes showed more activity in attacking our bombing and low-flying machines. In air-fighting six hostile machines were brought down. Nine of our aeroplanes are missing, two of which were seen to collide over the enemy's lines."

General Headquarters, November 25th.

"On the 24th inst. the weather was bad, but several reconnaissances were carried out by our aeroplanes. In the battle area bombs were dropped on the enemy, and machine-gun fire was opened against his troops. In the afternoon the violence of the gale made it almost impossible for machines to leave the ground. One of our aeroplanes has not returned."

General Headquarters, November 27th.

"On the 26th inst. the weather was slightly better for flying, but low clouds and a strong wind again hindered work in the air. Some successful artillery work was done by our aeroplanes, and many photographs were taken. Enemy troops, batteries, and transport were constantly attacked by our low-flying machines. During the day bombs were dropped on the crossings over the River Sensée and on railheads near Cambrai and north of Douai. At night Douai station was attacked, and bombs were also dropped at Somain station and sidings. Over 3 tons of bombs were dropped in all. A few fights took place, in which one hostile machine was brought down and four were driven down out of control. Another hostile machine was shot down by fire from the ground. None of our aeroplanes are missing."

General Headquarters, November 28th.

"On the 27th inst., although there was a very high wind, with rain, most of the day a few important reconnaissances were carried out successfully by our aeroplanes. A little artillery work was done also, and the enemy's troops in their trenches were engaged with machine-gun fire from the air. During the night, in boisterous weather, over a ton of bombs were dropped on Menin railway station. One of our machines is missing."

General Headquarters, November 29th.

"On the 28th inst. there was a slight improvement in the weather, the visibility at times being good, but a very strong west wind and clouds interfered with the co-operation of our aeroplanes with the artillery as well as with reconnaissance work. A number of photographs were taken, and over 130 bombs were dropped during the day on Courtrai, Roulers, Menin, and Thourout railway stations, and on other targets in the Ypres battle area. At night, in spite of the strong wind and clouds, 17 heavy bombs were dropped on Roulers railway station, and many rounds were fired from machine guns into the enemy's huts in the neighbourhood. One hostile machine was driven down out of control. Three of our aeroplanes are missing."

General Headquarters, November 30th.

"There was a distinct improvement in the weather, and a full day's flying was possible. Work with the artillery was successfully carried out by our aeroplanes, many photographs were taken, and several thousand rounds were fired into the enemy's infantry from low heights. During the day 180 bombs were dropped on a large ammunition dump north of Cambrai, on Roulers railway station, and on hostile billets in the battle area. Enemy aircraft were very active, attempting to interfere with our artillery and photographic machines. In air fighting, five hostile machines were brought down and two were driven down out of control. Another hostile machine was shot down by machine gun fire from the ground. Three of our aeroplanes are missing."

War Office, November 30th.

"*Palestine.*—In an air encounter five hostile aeroplanes attacked three of our machines; one Turkish machine was driven down out of conrtol and one damaged."

General Headquarters, December 1st.

"On November 30th, clouds were at a height of 2,000 ft. all day, but our aeroplanes were out continuously co-operating with the other arms in the counter-attacks against the enemy south-west of Cambrai. Our artillery machines, in addition to registering our guns, located and reported over 200 hostile batteries. The bombing machines concentrated their efforts on troops and transport collected in the villages in rear of the battle, dropping over 200 bombs. The enemy's troops and transport moving on roads behind the fighting also offered good targets to our scout pilots, who fired over 15,000 rounds at them from their machine guns. The fighting in the air was very severe, and resulted greatly in our favour. Fifteen hostile machines were brought down and three others were driven down out of control. Seven of our machines are missing."

General Headquarters, December 2nd.

"On the 1st inst., in spite of the clouds and mist, which rendered flying almost impossible, several reconnaissances of the areas in rear of the battlefronts were carried out successfully by our aeroplanes. Over 60 bombs were dropped, and many rounds were fired with machine guns from the air at columns of the enemy's infantry on the road. During the night bombs were dropped on Roulers station. Only a few combats took place, in which two hostile machines were brought down. Another hostile machine was compelled to make a forced landing and struck the ground in a shell crater. One of our machines is missing."

War Office, December 2nd.

"*Salonica.*—Bombing raids were successfully carried out on Tul Keram, an important junction on the Turkish line of communications. About a ton of bombs was dropped on the camp, railway, anti-aircraft batteries, and aerodrome."

General Headquarters, December 3rd.

"On the 2nd instant, in spite of a very strong north-west wind, our aero-

planes were active reconnoitring the enemy's new positions and observing for our artillery. Many bombs were dropped and machine-guns fired from a low height on villages occupied by the enemy's reserve troops north of Bourlon.

"The enemy's batteries on the Ypres battle front were also engaged with machine-gun fire and bombs.

"Hostile aircraft activity was slight, and few fights took place. One German machine was brought down. Five of our aeroplanes are missing."

French. *Paris, November 22nd.*

"*Salonica.*—An enemy aeroplane piloted by the German Lieut. von Eschewege, was brought down."

Paris, November 23rd.

"Two German aeroplanes were brought down yesterday, one after a fight with one of our pilots, the other by our machine gun fire."

Paris, November 24th.

"Dunkirk was bombarded last night by aeroplanes. There were no victims. Material damage was insignificant."

Paris, November 25th.

"*Salonica.*—Our airmen have dropped bombs on the enemy establishments at Vasarcica on the Prilep Road."

Paris, November 26th.

"*Salonika.*—In the region of Monastir and the Tcherna our artillery and air forces have been active."

Paris, November 27th.

"*Salonica.*—British airmen have been active. On the 26th they bombed the railway station at Drama and the neighbourhood of Seres."

Paris, November 28th.

"*Salonica.*—In the region of Monastir an enemy aeroplane was brought down by our machine gun fire."

Paris, November 30th.

"*Salonica.*—French airmen carried out several bombardments in the valley of the Vardar and to the north of Monastir. Three enemy machines were brought down, two by British airmen and one by French artillery."

Paris, December 1st.

"*Salonica.*—British airmen bombed the region of Rupel and the railway from Drama to Seres. On the Russian front Bulgarian attempts at fraternisation were repulsed with rifle fire."

Italian. *Rome, November 21st.*

"Our aircraft carried out effective bombardment operations and fought several duels with hostile aeroplanes, as a result of which two enemy machines were brought down."

Rome, November 22nd.

"Our seaplanes continue to carry out each day reconnaissance operations and bombardments against the enemy's vessels, troops, and works, to direct the fire of the guns, and have been engaged in violent aerial combats.

"On November 16th a number of chaser aeroplanes attacked a group of enemy machines with a numerous escort. An enemy torpedo-boat destroyer was hit by an incendiary bomb from one of our seaplanes, and one of the enemy aeroplanes was brought down, with one of its wings broken, by two of our machines (pilots Sergt. Levi and Sergt. Cornillon). On November 18th two of our seaplanes gave chase to three enemy aeroplanes engaged in reconnaissance on the Sile front, and brought down the machine K 211, the aviators being taken by air as prisoners to Venice.

"On November 19th another of our seaplanes, while making a photographic reconnaissance, was attacked by two enemy machines. It bravely gave battle and brought one of them down. On the same day an enemy torpedo-boat destroyer near Punto di Tagliamento was attacked by one of our seaplanes and hit by a bomb. On November 20th another enemy aeroplane, after a battle in the air, was forced to descend rapidly on the other side of the Piave."

Rome, November 23rd.

"On the 22nd one of our seaplanes, flying over Grado at a height of 3,600 metres, was attacked by three enemy seaplanes, one of which it brought down, whereupon the other two fled."

Rome, November 25th.

"Near Mount Grapper two enemy aeroplanes were brought down by one of our aviators."

Rome, November 28th.

"On the Asiago Plateau, in the Primolano basin, at the north of the Col della Berretta, and on the Middle Piave, our batteries, in co-operation with bombardment flights, have carried out concentrations of fire on the enemy troops massed and in movement.

"Four enemy aeroplanes were brought down or forced to land by our airmen."

Rome, November 30th.

"Above Asiago an enemy aeroplane was brought down in an air combat.

"Last night enemy encampments between Feltre (on the Piave) and Fonzaso (6 miles farther west) were effectively bombarded by our machines."

Rome, December 1st.

"Our airmen were intensely active. Enemy encampments in the hollow of Arten were bombarded, and three enemy machines were brought down in aerial duels. One captive balloon was set on fire and another forced to land."

Roumanian. *Jassy, November 28th.*

"On November 23rd, as the result of an aerial battle between three enemy airmen and three of our own men, one enemy machine was brought down by Pilot Lieutenant Craeu and Lieutenant Nasta in the region of Mandresti. During the course of the same battle Pilot Plutonnier Muntenescu, seriously wounded, fell with his machine whilst trying to land near Tecuci."

German. *Berlin, November 22nd.*

"Lieut. Böhme, by the shooting down of an enemy aeroplane, has gained his 22nd aerial victory."

"*Balkans.*—Lieut. von Eschwege brought down an enemy captive balloon, thus gaining his 20th aerial victory."

Berlin, November 24th.

"Since November 20th our opponents have lost 27 aeroplanes in aerial battle and by anti-aircraft fire. Capt. Baron von Richthofen has gained his 62nd, Lieut. Baron von Richthofen his 26th, and Lieut. Bongartz his 24th aerial victory."

Berlin, November 26th.

"Our infantry, battle, and pursuing airmen, who, in spite of the violent storm and rain, successfully intervened in the fighting on the battlefield near Cambrai and on the Meuse, supported our indefatigable leadership and troops."

Berlin, November 30th.

"In aerial engagements and by fire from the ground our opponents have lost 30 aeroplanes and two captive balloons. Lieutenant Buckler gained his 30th aerial victory, Lieutenant Bongartz his 25th, Lieutenant Boehme his 24th, and Lieutenant Klein his 21st."

Berlin, December 1st.

"Captain Baron Richthofen and Lieutenant Klein have respectively secured their 63rd and 22nd aerial victory."

Berlin, December 3rd.

"In the last three (? days) our opponents have lost in aerial fighting and by gunfire from the ground 27 aeroplanes and two captive balloons. Lieut. Müller obtained his 35th aerial victory, Lieut. von Bülow his 27th and 28th, and Lieut. Bongartz his 25th and 26th."

Turkish. *Constantinople, November 28th.*

"An enemy aeroplane dropped bombs upon Gallipoli, injuring a woman and two children."

Constantinople, November 30th.

"A British captive balloon was brought down by one of our airmen. Bombs were dropped successfully on enemy provision and munition depôts."

Bulgarian. *Sofia, November 21st.*

"Three enemy aeroplanes were brought down in aerial combat between the Tcherna and the Vardar, and a fourth was shot down by our artillery in the Struma Valley."

Sofia, November 22nd.

"The German Sub-Lieutenant von Eschwege was hit by the enemy's anti-aircraft fire and perished gloriously in the air. The Bulgarian Army, which rejoiced at all times at the exploits of this incomparable champion of the air, will cherish him in affectionate and lasting memory."

Sofia, November 29th.

"After an air fight the German Sergt.-Major Lage brought down an enemy aeroplane, which fell behind our positions south of Stoikovo."

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British Flyers in Italy.

WRITING from the Italian Headquarters on December 3rd, Mr. G. Ward Price says :—

"The first shots exchanged between the British Expeditionary Force and the Germans on the Italian front have brought success to our arms. It was an encounter in the air, and the Royal Flying Corps opened this new campaign with an achievement of good augury, for the very first day that our airmen crossed the enemy lines they shot a German machine to pieces, and sent it crashing to earth on the banks of the Piave.

"Four of our machines crossed over to the German side of the river for a flight along the northern sector of the plain. The little squadron had not gone five miles before they were attacked by five German Albatros scouts. One of these enemy machines was immediately driven down in a vertical dive, but at 5,000 ft. it flattened out again.

"Meanwhile the fight went on with the rest. After 20 minutes of continual manœuvring and occasional bursts of fire another of the enemy was driven down. His British antagonist followed him in his dive, and as the German flattened out again the English pilot got a burst of 80 rounds into him at close range. That ended the fight. The right wing of the German machine collapsed and fell back along the *fuselage*. At once the Albatros turned over and fell, the rest of the right wing breaking loose as it crashed to earth.

"By this time the enemy had received reinforcements, but for all that another of his aeroplanes was driven down out of control below 5,000 ft. Then the four British machines returned, having encountered in this first outing of theirs 12 German adversaries, of which they had smashed up one and seriously damaged two.

"Flying conditions here will be very different for our airmen from those to which they were accustomed in France. For one thing they will probably have to carry out reconnaissance flights above high mountains. Good landing places are very scarce even in the plain. However hard conditions may be here, those pilots and observers who have had experience of Flanders believe that there is no chance that their work will prove more arduous than it was in France."

Air Raid Gallantry Rewarded.

BOW STREET Police Court *can* be a welcome place in which to foregather. It depends upon the circumstances. One instance of the sort may be noted last Saturday, when Sir John Dickinson presented to Sub-Divisional Inspector Wright, L Division, £15, and to Constables Melton and Christmas £12 each from the Police Reward Fund for gallantry on October 19 during the Zeppelin raid. Entering a burning house where much gas was escaping, they hewed a hole in the floor and rescued thirteen persons. Drs. J. F. Williams and Chas. H. Pring, also quiet heroes in their way, although in danger from the tottering ruins, attended all night to the injured.

To Readers—One and All.

THE Editor of "FLIGHT" will at all times be pleased to consider original articles (illustrated or otherwise) on subjects directly or indirectly allied with aviation. All articles accepted will be paid for; a high literary standard of writing is not essential; it is the facts which matter. Practical explanatory articles are most acceptable. Diagrams and similar illustrations need only be rough sketches if necessary.

The British Air Services

"PER ARDUA AD ASTRA."

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, it is not repeated in this column.

Royal Naval Air Service.

Admiralty, November 28th.

The following have been entered as Prob. Flight Officers (temp.):—S. K. Ford, H. G. Luther, G. W. Platt, L. C. Biddle, H. L. Jones, and H. D. Johnson.

H. D. Crofts entered as Prob. Flight Officer, seniority Dec. 31st.

E. A. Loombes entered as Prob. Observer Officer (temp), seniority Dec. 3rd.

H. G. Arnold entered as Warrant Officer, 2nd grade (temp.), seniority Nov. 30th.

The following have been granted temp. commissions (R.N.V.R.), seniority as stated:—Lieuts. E. L. Parret, Nov. 24th; W. Hayward and B. J. Ellis, Dec. 3rd, and appointed the *President II*, for R.N.A.S.; Sub-Lieuts. C. E. North, Nov. 20th; G. H. Simpson and J. R. Cox, Nov. 29th and 30th, and both appointed to *President II*, for R.N.A.S.

W.O. (II.).—D. S. W. Hambly, promoted to Lieut., R.N.V.R. (Temp.), seniority Nov. 24th.

Admiralty, November 29th.

Flight Commanders (Temporary).—R. Graham, D.S.C., and L. S. Breadner, D.S.O., both granted act. rank of Squadron Comdr., seniority Nov. 9th.

Flight Lieutenants (Temporary).—L. H. Slatter, B. S. Wemp, and F. E. Banbury, all granted act. rank of Flight Comdr., seniority Nov. 9th.

Flight Sub-Lieutenant (Temporary).—A. C. Burt, granted act. rank of Flight Lieutenant, seniority Nov. 9th.

Admiralty, December 1st.

J. E. L. England and G. F. Kennedy, both entered as Prob. Flight Officers (Temp.), seniority Dec. 10th.

The following have been entered as Prob. Observer Officers (Temp.), seniority as stated:—J. G. M. Farrall, Nov. 23rd; C. W. Dodds, and C. J. T. Boys, both Nov. 24th.

E. Meredith (late Prob. Flight Officer, Temp.), re-entered as Prob. Observer Officer (Temp.), seniority May 13th.

Lieutenant (Temp., R.N.V.R.).—C. C. Turner, promoted to Lieut.-Comdr. (Temp., R.N.V.R.), seniority Nov. 5th.

Admiralty, December 3rd.

Warrant Officer (1).—P. H. Hunter, entered as Proby. Observer Officer, seniority Dec. 5th.

J. E. Greenwell, entered as Proby. Flight Officer (temp.), seniority Nov. 25th.

Royal Flying Corps (Military Wing).

London Gazette Supplement, November 26th.

Schools of Instruction.—Schools of Military Aeronautics.

General List.—To be Temp. 2nd Lieuts.:—H. E. Gridley; Aug. 5th. L. Francis; Sept. 20th. Temp. Asst. Engr. W. J. Springtall, from R. Ind. Mar.; Oct. 1st. Sergt. A. G. Pointing, from R.F.C.; Oct. 18th. The appointment of 1st Class Air Mech. A. D. Simmonds as Temp. 2nd Lieut. (on prob.), notified in *Gazette* of Oct. 5th, is ante-dated to June 9th. To be Temp. 2nd Lieuts. (on prob.):—Actg.-Sergt. D. W. Dean, from R.F.C.; Sept. 13th. R. Fell (late Aircraftsman, 2nd Grade, R.N.A.S.); Oct. 19th. Sergt. A. G. Ackermann, from O.T.C.; 2nd Class Air Mech. J. Armitage, from R.F.C.; Pte. W. F. Bate, from A. Pay Corps; 2nd Class Air Mech. P. G. Beesley, from R.F.C.; 3rd Class Air Mech. L. M. Britten, from R.F.C.; Sergt. C. L. G. Colebrook, from R.F.C.; Temp. Sergt.-Maj. A. S. Donaldson, from R.F.C.; Reg. Qrmr.-Sergt. B. Freeman, from Lond. R. (T.F.); Corpl. J. Hardy, from A.S.C.; Co. Qrmr.-Sergt. R. A. C. Cradock-Hartopp, from R. Fus.; 2nd Class Air Mech. H. Barnes-Moss, from R.F.C.; 1st Class Air Mech. L. Knowles, from R.F.C.; Pte. T. P. Prichard, from A.S.C.; Pte. C. S. M. Raikes, from A.S.C.; Pte. A. H. Scaife, from A.S.C.; L'-Corpl. J. H. M. Stevenson, from Trg. Res.; Temp. Sergt.-Maj. D. F. Winch, from R.F.C.; Co. Qrmr.-Sergt. W. G. Webber, from R.E.; Sergt.-Maj. H. Woffenden, from R.F.C.; 1st Class Air Mech. F. M. Burr, from R.F.C.; Spr. A. M. Combs, from R.E. (T.F.); Corpl. P. L. Hill, from R.F.C.; Corpl. D. H. S. Reid, from A.S.C.; Co. Sergt.-Maj. J. R. Coulthard, from Lond. R. (T.F.); 1st Class Air Mech. O. N. H. Watson, from R.F.C.; 3rd Class Air Mech. W. E. Langton, from R.F.C.; Temp. Sergt.-Maj. W. Warwick, from R.F.C.; Oct. 23rd. W. H. Preston, C. G. Whitmore; Nov. 4th. L. G. Sewell; Nov. 7th. J. M. Poyntz, J. Mackie; Nov. 8th. E. T. W. Nockold, A. E. Mills; Nov. 16th. 1st Class Air Mech. L. W. Scoggins, from R.F.C.; Nov. 14th.

London Gazette Supplement, November 27th.

The following appointments are made:—

Wing Commander.—Capt. (Temp. Maj.) S. Grant-Dalton, D.S.O., York. R., from a Sqdn. Comdr., and to be Temp. Lieut.-Col. whilst so employed; Nov. 1st.

Flying Officers.—Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—W. L. Hope; Oct. 17th. L. H. Reeve, R. F. Buick, E. M. Forsyth, L. Duffus; Oct. 20th. W. J. B. Nel, F. R. P. Williams, F. H. Hayns, T. F. Rigby, S. T. B. Cripps; Oct. 31st. J. F. V. Atkinson; Nov. 2nd. J. Brydone, J. Todd; Nov. 3rd.

Assistant Instructors in Gunnery.—Graded as Equipment Officers, 3rd Class—Temp. 2nd Lieut. P. L. Smith, Gen. List, from a Flying Officer; Sept. 23rd. 2nd Lieut. C. B. Harris, Suff. R. (T.F.), and to be secd.; Nov. 10th.

Equipment Officers, 2nd Class.—Temp. 2nd Lieut. W. J. King, Gen. List, from the 3rd Class, and to be Temp. Capt. (without the pay or allowances of that rank) whilst specially employed; July 1st (substituted for the notification in the *Gazette* of Oct. 8th. Temp. 2nd Lieut. F. Hickman, Gen. List, from the 3rd Class, and to be Temp. Lieut. whilst so employed; Oct. 1st. 3rd Class—Temp. 2nd Lieut. (on prob.) G. H. Patey, Gen. List, and to be confirmed in his rank; Aug. 1st. Temp. 2nd Lieut. J. Drew, Cam'n Highrs., andt o be transfd. to R.F.C., Gen. List; Sept. 1st. Temp. 2nd Lieut. (on prob.) A. T. B. Kell, Gen. List, and to be confirmed in his rank; Sept. 28th. Temp. Lieut. C. H. Masters, attd. N. Staff. R., and to be transfd. to R.F.C., Gen. List; Sept. 30th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—R. R. Crosby, J. A. Armstrong; Oct. 1st. W. A. Hipkiss; Oct. 8th. 2nd Lieut. (on prob.) A. V. McPhail, S.R.; Oct. 15th. Lieut. C. Russell, R.E. (T.F.), and to be secd.; Oct. 29th. Temp. 2nd Lieut. (on prob.) C. J. Polden, Gen. List, and to be confirmed in his rank; Nov. 14th.

Schools of Instruction.—Schools of Military Aeronautics.

Instructor.—Graded as an Equipment Officer, 1st Class.—Temp. Lieut. P. P. Capelli, Gen. List, an Equipment Officer, 2nd Class, and to be Temp. Capt. whilst so employed; Oct. 1st.

Assistant Instructors.—Graded as Equipment Officers, 2nd Class.—Temp. 2nd Lieut. R. Leake, Gen. List, an Equipment Officer, 3rd Class, and to be Temp. Lieut. whilst so employed; July 6th. Temp. Lieut. H. J. L. Cappel, Gen. List, a Flying Officer (Obs.); Aug. 16th. Lieut. A. Hollingworth, Canadian Local Forces, a Flying Officer (Obs.); Aug. 29th. Capt. H. C. Waghorn, Lond. R. (T.F.), a Flying Officer (Obs.); Lieut. G. Curgenven, Yeo. (T.F.), a Flying Officer (Obs.); 2nd Lieut. W. G. Duffield, S.R., an Equipment Officer, 3rd Class, and to be Temp. Lieut. whilst so employed; Oct. 1st. Graded as an Equipment Officer, 3rd Class—2nd Lieut. (Temp. Lieut.) F. H. L. Varcoe, M.C., Midd'x R. (T.F.), a Flying Officer (Obs.); June 30th.

General List.—Temp. Capt. E. L. Chute relinquishes his commission on account of ill-health contracted on active service, and is granted the hon. rank of Capt.; Nov. 28th.

Supplementary to Regular Corps.—Lieut. N. J. Macdonald is placed on the retired list on account of ill-health; Nov. 28th.

London Gazette Supplement, November 28th.

The following appointments are made:—

Squadron Commander.—The initials of 2nd Lieut. (Temp. Maj.) J. T. Whittaker, M.C., A.S.C., are as now described, and not as in the *Gazette* of Oct. 4th.

Flying Officers.—Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—A. G. Tyrrell; Aug. 24th. H. W. Hewson; Aug. 29th. Temp. 2nd Lieut. L. Francis, Gen. List; Sept. 20th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—S. H. Love, R. J. Harris; Sept. 22nd). Temp. 2nd Lieuts., Gen. List:—R. Biggar, A. A. Callender, A. L. Porter, E. Scramlin; Sept. 22nd. J. A. Watson; Sept. 23rd. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—R. E. Stewart, S. W. Taylor; Sept. 24th. E. J. Baynes, C. A. W. Gallagher; Sept. 25th. J. H. Morris, F. M. Squires; Sept. 26th. L. G. Bowen; Sept. 27th. E. W. O. Hall; Sept. 28th. Temp. 2nd Lieuts, Gen. List:—M. A. Tancock, N. H. Barlow, K. Kennedy; Oct. 2nd. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—A. M. Clermont, W. G. Holden; Oct. 3rd. Temp. 2nd Lieuts., Gen. List:—J. G. Moore, A. R. Taylor. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—C. E. Perkins; Oct. 4th. H. E. Read; Oct. 5th. Temp. 2nd Lieuts., Gen. List:—F. L. Hale, V. Topping; Oct. 8th. Temp. 2nd Lieut. (on prob.) M. P. McLeod, Gen. List, and to be confirmed in his rank. Temp. 2nd Lieuts., Gen. List:—J. L. Younghusband; Oct 9th. P. McK. Haldimand, K. T. Nicol; Oct. 11th. A. W. Blackie; Oct. 12th. Temp. 2nd Lieuts., Gen. List:—J. I. Bedingfield, H. R. Carson, H. H. Cooper, H. J. Hill, R. L. Johnson, W. Lambert, C. P. McDonald, G. C. Mackenzie, K. D. Macpherson, E. H. Menhenitt, J. G. Monaghan, W. J. Pace, J. D. McR. Reid, C. A. L. Sherwood, S. Symons, D. J. Teepoorten; Oct. 13th. 2nd Lieut. W. L. Christian, R.A., and to be secd.; Oct. 20th. Lieut. H. J. Burden, Canadian Forestry Corps. From Flying Officers (Obs.):—Temp. 2nd Lieut. A. W. Waddy, Gen. List, seniority from Oct. 13th, 1916; Lieut. F. C. J. Whigham, Canadian Local Forces, seniority from Nov. 9th, 1916; Temp. 2nd Lieut. (Temp. Lieut.) T. C. Lowe, R.E., seniority from Nov. 14th, 1916; Temp. Lieut. G. Heasman, Gen. List, seniority from Nov. 29th, 1916; Oct. 29th. Temp. 2nd Lieut. R. L. Roe, Gen. List; Oct. 31st, seniority from Dec. 29th, 1916.

Flying Officers (Observers).—Temp. 2nd Lieut. (on prob.) J. T. Johnson, Gen. List, and to be confirmed in his rank; Nov. 8th, seniority from May 9th. 2nd Lieut. C. A. Linghi, L'pool R. (T.F.), and to be secd.; Nov. 6th, seniority from Aug. 15th. Temp. 2nd Lieut. W. E. Rothwell, Lan. Fus., and to be transfd. to R.F.C. Gen. List; Nov. 7th, seniority from Sept. 10th. Lieut. L. V. J. Pogson, M.C., Ches. R., and to be secd.; Nov. 8th, seniority from Sept. 24th.

General List.—To be Temp. 2nd Lieuts.:—M. A. Tancock; Sept. 1st. R. Biggar, A. A. Callender, K. Kennedy, J. G. Moore, A. L. Porter, E. Scramlin, A. R. Taylor, J. A. Watson, N. H. Barlow, A. W. Blackie, F. L. Hale, P. McK. Haldimand, K. T. Nicol, V. Topping, J. L. Younghusband; Sept. 22nd. J. I. Bedingfield, H. R. Carson, H. H. Cooper, H. J. Hill, R. L. Johnson, W. Lambert, C. P. McDonald, J. D. McR. Reid, G. O. Mackenzie, K. D. Macpherson, E. H. Menhenitt, J. G. Monaghan, W. J. Pace, S. Symons, C. A. L. Sherwood, D. J. Teepoorten; Oct. 13th. Hon. 2nd Lieut. L. J. Gavin, late North'd Fus.; Nov. 8th. Sergt. G. Bainbridge, from R.F.C.; Nov. 12th. To be Temp. 2nd Lieuts. (on prob.):—A. E. Ryan, G. K. Runciman, E. J. Salter, F. W. Savignac, W. Shaw-Thomson, W. E. Shields, R. A. Smith, C. B. Stenning, E. R. Stock, W. H. Smith, W. H. Taylor, W. H. Townsend, C. S. Williams, R. Willey, F. Westing, J. P. West, G. A. Welsh, K. Whitney, R. M. Whitmore, J. S. Wood; Oct. 13th. Cadets to be Temp. 2nd Lieuts. (on prob.):—J. Adamson, T. F. Aitchson, A. E. Alderton, H. C. Alexander, D. Aserman, B. L. Banks, G. Begg, J. G. Berry, P. Bertrand, S. C. Booth, S. Borson, H. J. Browne, T. S. Bulman, J. C. Dempster, A. F. Forsyth, D. F. Grant, H. C. Hagaman, V. Henry, H. E. B. Holden, J. B. Isaacs, C. H. Jehan, B. L. Levi, J. Lindsay, W. J. McLean, L. T. Marks, J. W. Marshall, R. MacC. Marshall, P. E. Mercer, C. F. R. Mercer, C. F. R. Price-Hughes, F. C. Rider, E. M. Saunders, S. H. Scott, J. Silverman, W. F. Simpson, G. D. N. Snyman, E. J. Stevenson, F. H. Thirkell, A. D. Watson, J. Webster, J. H. Weir, T. C. Welch, A. W. Welsh, R. E. Wimbush, N. Wilson, W. M. Wormald, G. Wright, S. A. Young; Nov. 22nd.

London Gazette Supplement, November 29th.

The following appointments are made:—

Flight Commanders.—From Flying Officers:—Capt. J. S. G. Collie, R.F.A. (T.F.); Nov. 15th. To be Temp. Capts. while so employed:—Temp. Lieut. R. A. Walmisley, Gen. List; Temp. 2nd Lieut. (Temp. Lieut.) J. A. Barton, Gen. List; 2nd Lieut. (Temp. Lieut.) E. P. Roberts, M.C., R. Suss. R.; 2nd Lieut. (Temp. Lieut.) D. W. Forshaw, S. Wales Bord. (T.F.); Lieut. C. E. S. Russell, S. R.; Temp. Lieut. J. V. Aspinall, Gen. List; 2nd Lieut. D. S. Kennedy, M.C., S.R.; Lieut. W. G. Cope, York R., S.R.; Lieut. S. G. Rome, M.C., Arg. and Suth'd Highrs.; 2nd Lieut. (Temp. Lieut.) J. B. E. Crosbie, Worc. R.; 2nd Lieut. (Temp. Lieut.) F. A. Coward, R.W. Surr. R.; 2nd Lieut. (Temp. Lieut.) C. R. Steele, York R.; 2nd Lieut. (Temp. Lieut.) F. P. Scott, Yeo. (T.F.); 2nd Lieut. (Temp. Lieut.) J. B. F. Austin, Hrs.; Lieut. W. Roche-Kelly, S.R.

Flying Officers.—Temp. 2nd Lieut. D. K. Paris, M.C., Gen. List, from a Flying Officer (Observer); March 19th, seniority April 13th, 1916. Temp. 2nd Lieut. (on prob.) R. P. J. Grebby, Gen. List, and to be confirmed in his rank; Sept. 4th. Lieut. W. Beart, R.F.A., S.R.; Nov. 6th. Lieut. E. T. S. Kelly, Canadian Exped. Force; Nov. 7th. Lieut. C. B. Matthews, R. W. Surr. R., from M.G. Corps. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—H. Mason, G. A. Forsgate, W. M. Carlaw; Nov. 9th.

Assistant Instructors in Gunnery.—(Graded as Equipment Officers, 3rd Class).—Lieut. T. W. L. Dickson, S.R., from a Flying Officer; Temp. 2nd Lieut. R. C. Doughty, Gen. List, from a Flying Officer (Obs.); Temp. 2nd Lieut. (on prob.) C. G. Stevens, Gen. List, and to be confirmed in his rank; Nov. 3rd.

Equipment Officers, 3rd Class.—Temp. Lieut. R. F. Messervy, Gen. List; July 28th. 2nd Lieut. (Temp. Lieut.) J. D. Whiteman, R.E. (T.F.); Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank:—W. S. Jackson; Oct. 11th. F. Reynolds; Oct. 18th. Capt. M. K. Ryan, Canadian Exped. Force; Temp. 2nd Lieut (on prob.) A. Haigh, Gen. List, and to be confirmed in his rank; Nov. 1st.

General List.—To be Temp. 2nd Lieuts. (on prob.) :—N. C. Roystan, E. B. Lee, J. J. Lanctot, A. R. Knowles, M. R. James, P. R. Hampton, D. W. Gordon, D. R. Glen, R. E. Dubber, J. Farley, W. R. Eastman, C. J. Gillan, A. McM. Philips, G. Ponsford, L. M. Price, M. F. Peiler, F. C. Crummey, J. I. Crofton, R. E. Cleary, W. G. Claxton, B. De Salaberry, F. Lord, H. W. McKeague, W. D. G. Murray, G. McK. MacWilliams, E. T. Morrow, J. N. Bartlett, H. A. Wallace, A. Talbot, J. W. Trusler, C. S. Stonehouse, S. T. Stephens, C. S. Sheldon, E. K. Davidson, D. R. Eccles, R. G. Reid, E. A. Magee ; Sept. 22nd. H. Browne, V. R. Brown, E. M. Brown, H. G. Nelson, J. F. Kneale, F. Jeffreys, J. W. Coons, H. V. Jellicoe, J. S. Common, G. T. Bodycomb, L. Campbell, A. C. Oxley, A. W. Blowes, H. G. Dugan, R. G. Hall, D. W. Pratt, P. G. Ratliff, J. A. Ruggles, W. A. Pell, F. E. McC. Macy, R. Manzer, F. G. McNeil, R. F. McRae, H. C. Little, T. Le Messurier, G. D. Horton, O. St. C. Harris, G. L. R. Parrish, L. H. Cunningham, E. S. Coler, F. E. Daniel, C. M. G. Farrell, J. D. M. Gray ; Oct. 13th. A. Marr ; Nov. 11th. 2nd Class Air Mech. H. Edwards, from R.F.C. ; Flt.-Sergt. W. D. Corse, from R.F.C. ; 1st Class Air Mech. A. G. Clayton, from R.F.C. ; 1st Class Air Mech. J. C. Gemmell, from R.F.C. ; Corpl. A. W. Tipp, from R.F.C. ; Sergt. A. J. Kurn, from R.F.C. ; 2nd Class Air Mech. O. G. Pike, from R.F.C. ; 1st Class Air Mech. (Actg.-Corpl.) G. A. Tandy, from R.F.C. ; 1st Class Air Mech. R. C. Brown, from R.F.C. ; Sergt. W. G. Horton, from R.F.C. ; 2nd Class Air Mech. A. T. Williams, from R.F.C. ; 1st Class Air Mech. A. J. Winter, from R.F.C. ; Nov. 14th. W. F. Arnold, G. H. Mansell, T. H. C. Bannister, C. W. Beutley, H. W. Baylis, P. J. Beeby, W. P. F. Bisgood, R. J. Bright, A. J. Evans ; Nov. 16th. Cdt. W. Espley ; Nov. 17th.

London Gazette Supplement, November 30th.

The following appointments are made :—

Assistant Director of Aviation.—Maj. N. D. K. MacEwen, D.S.O., Arg. and Suth'd Highrs., and to be Temp. Lieut.-Col. whilst so employed, vice Capt. P. W. L. Broke-Smith, R.E. ; Aug. 16th, 1916 (substituted for the notification in the *Gazette* of Sept. 5th, 1916).

Squadron Commanders.—From Flight Comdrs., and to be Temp. Majs. whilst so employed :—Temp. Capt. W. J. Y. Guilfoyle, M.C., Gen. List ; Aug. 11th. Temp. Capt. L. F. Forbes, M.C., Gen. List ; Sept. 21st. Temp. Capt. F. J. Roberts, Gen. List ; Oct. 20th. 2nd Lieut. (Temp. Capt.) J. C. Callaghan, M.C., R. Muns. Fus., and to be secd. ; Oct. 21st. Capt. C. M. Crowe, M.C., S.R. ; Oct. 26th. Capt. G. R. Elliott, D. Gds. ; Oct. 27th.

Flight Commander.—Maj. A. D. Carter, Can. Exped. Force, from a Flying Officer ; Nov. 14th.

Flying Officers.—Temp. 2nd Lieut. (on prob.) W. F. Mayoss, Gen. List, and to be confirmed in his rank ; Sept. 1st. 2nd Lieut. C. F. P. Haslegrave, Sea. Highrs. (T.F.), and to be secd. ; Oct. 19th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—R. G. G. Mitchell ; Oct. 22nd. E. Pryke ; Oct. 24th. S. D. Macdonald ; Oct. 26th. R. A. Crabtree, F. Lockwood, J. N. Clitheroe ; Oct. 27th. Lieut. G. R. Whitaker, R.F.A., S. R. ; Lieut. E. E. Heath, Can. Divl. Ammn. Col. ; Oct. 29th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—D. H. C. Lye ; Oct. 29th. R. A. McLaren ; Oct. 30th. Temp. 2nd Lieut. E. C. Morris, Gen. List, from a Flying Officer (Obs.), with seniority from Nov. 28th, 1916. Lieut. F. A. Wood, Can. Exped. Force ; 2nd Lieut. C. H. Weir, R. Scots, S.R., and to be secd. ; Oct. 31st. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—W. H. Martin, R. Allan, J. E. A. Kernahan, F. J. Dawson ; Lieut. W. J. Gillespie, Canadian Exped. Force ; Oct. 31st. Lieut. W. T. A. Burkitt, Canadian Exped. Force ; Temp. 2nd Lieut. (on prob.) G. Miller, Gen. List, and to be confirmed in his rank ; Nov. 1st. Lieut. D. Stewart, R.G.A. (T.F.), Lieut. J. E. Price, Canadian Exped. Force ; Nov. 2nd. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—G. F. Yuill ; Nov. 2nd. P. Whiteley ; Nov. 3rd. W. H. Pollard ; Nov. 4th. Lieut. R. P. Ziegler, Canadian Exped. Force ; Nov. 5th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—T. H. H. Birley, G. W. Burgess ; Nov. 5th. Temp. 2nd Lieut. H. A. Dyer, Gen. List, from a Flying Officer (Obs.), seniority from Dec. 11th, 1916. Temp. 2nd Lieut. S. M. Goldsmith, W. Rid. R. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—T. M. Williams, J. H. Hargroves ; Lieut. J. H. Hudson, Canadian Exped. Force ; 2nd Lieut. W. G. Bryan, E. Surr. R., and to be secd. ; Nov. 6th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—S. E. Buck ; Nov. 6th. W. H. J. Dodge, E. O. Ockerbury, E. M. Parsons ; Lieut. J. McCone, Canadian Engrs. ; Nov. 7th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—R. A. Holiday, C. C. Wood ; Lieut. R. D. Leigh-Pemberton, G. Gds. ; Nov. 7th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—R. E. Neale, N. R. Smuts ; Nov. 8th. E. B. Young T. A. Armstrong ; Nov. 9th. Temp. 2nd Lieut. G. Bainbridge, Gen. List ; Nov. 12th.

Group Instructors in Gunnery.—(Graded as Flight Commanders).—2nd Lieut. (Temp. Capt.) H. J. Brewster, Middx. R., from an Instr. in Gunnery (graded as an Equipment Officer, 1st Class), and to retain his temp. rank whilst so employed ; Nov. 1st. The appointment of Lieut. (Temp. Capt.) N. D. G. Scott, N. Lanc. R., S.R., notified in the *Gazette* of Nov. 16th, is cancelled.

Balloon Officer.—2nd Lieut. R. Layer-Parker, R.F.A., S.R. ; Sept. 29th, seniority from May 6th, but without pay prior to Sept. 29th.

Park Commander.—Temp. Maj. E. G. Mackenzie, attd. R. Fus., and to be transfd. to R.F.C., Gen. List ; Oct. 10th.

Equipment Officer, 2nd Class.—2nd Lieut. A. T. Hawkins, S.R., from the 3rd Class, and to be Temp. Lieut. whilst so employed ; Nov. 1st.

Schools of Instruction.

School of Aerial Gunnery.—Chief Instructor.—The grading of Temp. Capt. G. Dixon-Spain, M.C., Gen. List, is as a Park Comdr. and not as in the *Gazette* of Sept. 6th.

General List.—The notification in the *Gazette* of Oct. 6th regarding Temp. Lieut. V. Bayley, L'pool. R., is cancelled ; Temp. 2nd Lieut. M. Dudbridge resigns his commission on account of ill-health contracted on active service, and is granted the hon. rank of 2nd Lieut. (Dec. 1st). Temp. 2nd Lieut. M. Morris resigns his commission ; Dec. 1st. Sergt. F. A. Barrett, from R.F.C., to be Temp. 2nd Lieut. ; Nov. 26th. To be Temp. Lieuts. (on prob.) :—C. T. Aulph, S. J. Allen, A. M. Beamer, G. G. Baird, G. F. Bayne ; Sept. 22nd. J. C. Davison ; Sept. 24th. H. N. Arthur, L. G. Arcand, W. H. Boyd, R. C. Bark ; Oct. 13th.

Memorandum.—Capt. (Temp. Maj.) P. W. L. Broke-Smith, R.E., to be Temp. Lieut.-Col., from July 1st to Aug. 15th, 1916, whilst employed as Asst. Dir. of Aviation.

Supplementary to Regular Corps.—Lieut. (Temp. Maj.) O. D. Filley, M.C. relinquishes his commission and is granted the hon. rank of Capt. ; Sept. 30th.

London Gazette Supplement, December 1st.

The following appointments are made :—

Squadron Commanders.—Lieut. (Temp. Capt.) C. E. H. Medhurst, R. Innis. Fus., from a Flight Comdr., and to be Temp. Maj. while so employed ; Sept. 15th.

Flight Commanders.—From Flying Officers, and to be Temp. Capts. while so employed.—Temp. Lieut. T. C. Chamberlain, Gen. List ; Nov. 16th. Lieut. R. A. Maybery, M.C., Lrs. ; Nov. 18th.

Flying Officers.—Temp. 2nd Lieut. (on prob.) F. R. Johnson, Gen. List, and to be confirmed in his rank ; Oct. 31st. Lieut. L. B. Rochester, Canadian Forestry Corps ; Temp. 2nd Lieut. (on prob.) E. E. Blakemore, Gen. List, and to be confirmed in his rank ; Nov. 9th. Temp. Lieut. A. V. Blenkiron, M.C., Gen. List, from a Flying Officer (Obs.) ; Nov. 10th, seniority from March 21st, 1916. Temp. 2nd Lieut. H. N. Barnard, Gen. List ; Nov. 19th. Temp. 2nd Lieut. F. A. Barrett, Gen. List ; Nov. 20th.

Flying Officers (Observers).—Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—C. Lillicrap ; Nov. 10th, seniority from June 18th. J. N. Stennett ; Nov. 11th, seniority from June 26th. G. A. King ; Nov. 10th, seniority from Sept. 3rd. 2nd Lieut. D. W. Hardie, S.R., seniority from Sept. 9th. 2nd Lieut. E. H. Stanes, Manch. R., S.R., seniority from Sept. 23rd, and to be secd. ; Nov. 12th. Temp. Lieut. P. Douglas, A.S.C., and to be transfd. to R.F.C. Gen. List ; Nov. 10th, seniority from Oct. 11th. The surname of 2nd Lieut. L. E. Shaw-Lawrence, E. Kent. R. (T.F.), is as now described, and not as in the *Gazette* of Oct. 11th.

Balloon Company Commander.—(Graded as a Flight Commander).—Temp. Lieut. T. Kenuie, Gen. List, from a Balloon Comdr. (graded as a Balloon Officer, and to be Temp. Capt. whilst so employed ; Nov. 4th.

Equipment Officers, 2nd Class.—Temp. Lieut. H. L. Billinton, Gen. List, from an Experimental Officer, 3rd Class (graded as an Equipment Officer, 3rd Class), Oct. 30th. From the 3rd Class, and to be Temp. Lieuts. whilst so employed :—Temp. 2nd Lieut. A. O. Fuller, Gen. List ; Nov. 1st. 2nd Lieut. F. O. Gibbon S.R. ; Nov. 22nd. 3rd Class.—2nd Lieut. S. T Kemp ; Aug. 28th. 2nd Lieut. R. H. Smyth, Glouc. R. (T.F.), and to be secd. ; 2nd Lieut. F. A. Dickinson, R.F.A., S.R., 2nd Lieut. H. T. H. Copeland ; Nov. 1st.

General List.—Temp. 2nd Lieut. S. E. Buck to be Temp. Lieut. whilst serving with R.F.C. ; Nov. 6th. Sergt. H. N. Barnard, from R.F.C., to be Temp. 2nd Lieut. ; Nov. 19th. The appointment of Cdt. G. E. Secker as Temp. 2nd Lieut. (on prob.), notified in the *Gazette* of Nov. 14th is cancelled. To be Temp. 2nd Lieuts. (on prob.) :—T. J. Young, W. B. Yuille ; Sept. 22nd. Cdts. to be Temp. 2nd Lieuts. (on prob.) :—H. B. Harmsworth, C. E. Rogers, R. J. L. Spinks ; Nov. 4th. E. P. Caton, R. K. Davis, E. Grayson, H. Hanson, O. L. Rogers ; Nov. 14th. The initials of Temp. 2nd Lieut. F. S. Hockaday, Gen. List, are as now described, and not as in the *Gazette* of Nov. 21st.

Memorandum.—Major S. F. McI. Lomer, K.R.R.C., to be Temp. Lieut.-Col. whilst commanding an R.F.C. Officers' Technical Training Wing ; Nov. 1st.

Supplementary to Regular Corps.—Lieut. F. Stoner relinquishes his commission on account of physical unsuitability as a pilot or observer ; Dec. 2nd. 2nd Lieuts. (on prob.) confirmed in their rank :—E. Hughes, D. W. Hardie.

General List. (R.F.C.).—The dates of appointment of Temp. 2nd Lieuts. W. H. Askew to J. A. Yates, and S. G. Coates to D. E. Webb, should be Aug. 26th and Aug. 27th, and not as in *Gazette*, Oct. 3rd (substituted for amendment in *Gazette* Oct. 26th).

London Gazette Supplement, December 3rd.

The following temporary appointment is made at the War Office :—

Deputy Director-General of Military Aeronautics.—Bt. Lieut.-Col. (Temp. Brig. Gen.) E. L. Ellington, C.M.G., R.A., from a Brig.-Gen., Gen. Staff, to retain his temp. rank whilst so employed, and to remain secd. ; Nov. 20th.

The following appointments are made :—

Flight Commander.—Lieut. O. C. Bryson, Yeo. (T.F.), from a Flying Officer, and to be Temp. Capt. whilst so employed ; Nov. 15th.

Flying Officers.—Temp. Lieut. J. E. H. Dakin, M.G. Corps, and to be transfd. to R.F.C., Gen. List ; Nov. 9th, seniority from Feb. 9th (without pay prior to Nov. 9th). The initials of Temp. 2nd Lieut. H. B. Howe, Gen. List, are as now described, and not as in *Gazettes* of May 26th and Nov. 12th.

Flying Officers (Observers).—Temp. 2nd Lieut. (on prob.) J. E. L. Skelton, Gen. List, and to be confirmed in his rank ; Sept. 16th, seniority from July 20th.

Balloon Officers.—Temp. 2nd Lieut. (on prob.) W. E. Giffard, Gen. List, and to be confirmed in his rank ; Sept. 27th. Temp. 2nd Lieuts., Gen. List :—G. Cornwall, R. F. Hatch ; Nov. 8th. Temp. 2nd Lieut. (on prob.) A. S. McGuffie, Gen. List, and to be confirmed in his rank.

Adjutant.—Major G. A. E. Chapman, D.S.O., E. Kent R., S.R. ; Oct. 29th.

Equipment Officers, 3rd Class.—Temp. 2nd Lieut. R. G. Fyfe, Manch. R., and to be transfd. to R.F.C. Gen. List ; July 20th. 2nd Lieut. A. C. Hill ; Aug. 3rd. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—D. H. Clement, G. A. Hill ; Oct. 12th. H. Sorrell ; Nov. 3rd. Temp. 2nd Lieut. F. S. Wallis, Gen. List, from a Balloon Officer ; Nov. 8th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—A. H. Silver, Nov. 9th ; W. A. G. Thicknesse, W. H. Short ; Nov. 12th. Temp. 2nd Lieut. T. V. J. Davison, Labour Corps, and to be transfd. to R.F.C., Gen. List ; Nov. 17th.

General List.—G. C. R. Hitchins, late Lieut., Leins. R., to be Temp. Lieut. ; Nov. 16th. Temp. 2nd Lieut. B. A. McGubbin resigns his commission on account of ill-health, and is granted the hon. rank of 2nd Lieut. ; Dec. 4th. Temp. 2nd Lieuts. (on prob.) confirmed in their rank :—L. Y. Cardall, G. A. King, F. T. Russell.

Camp Commandant (graded for purposes of pay as a Staff Captain).—Lieut. F. W. Angus, Arg. and Suthrd. Highrs. (T.F.), and to be Temp. Capt. whilst so employed, vice Temp. 2nd Lieut. T. J. Hudson, Gen. List and R.F.C. Oct. 16th.

Aeronautical Inspection Department.

London Gazette Supplement, November 30th.

J. A. Turner to be Temp. Hon. Lieut. while employed as Asst. Insp., A.I.D. Aug. 1st.

London Gazette Supplement, December 1st.

J. A. Whyte to be Temp. Hon. Lieut. whilst employed as an Asst Insp. A.I.D. ; Aug. 1st.

Good "Spotting" Work.

SOME fine "spotting" by an aviator, working in conjunction with a British monitor, is mentioned by Mr. G. Ward Price, writing to *The Times*. Three bridges across the lower Piave, which the enemy was using for supplying his troops, were recently destroyed by the British monitor *Picton*. The range was 18,000 yards (10¼ miles), and the three bridges lay 200 yards apart. One was a stone bridge, which the Austrians had repaired ; the other two were three yards wide. On these slight marks the monitor's guns put five hits out of seven shots. The very first shot was on the target, and the pontoon bridges were each hit at either end, one of them being so effectively cut in two that the aeroplane observer reported that the middle part of it floated away downstream. A shell was also dropped right into the stone bridge.

A German Aeroplane in Holland.

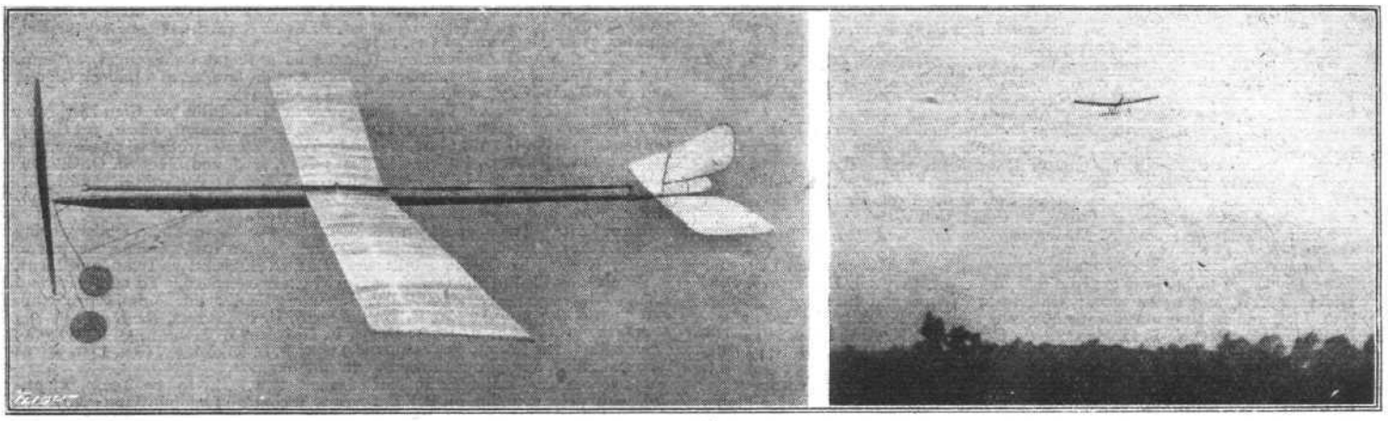
ACCORDING to the *Nieuwe Rotterdamsche Courant*, a German aeroplane landed in the province of North Brabant on Saturday, and the occupants have since been interned.

Models

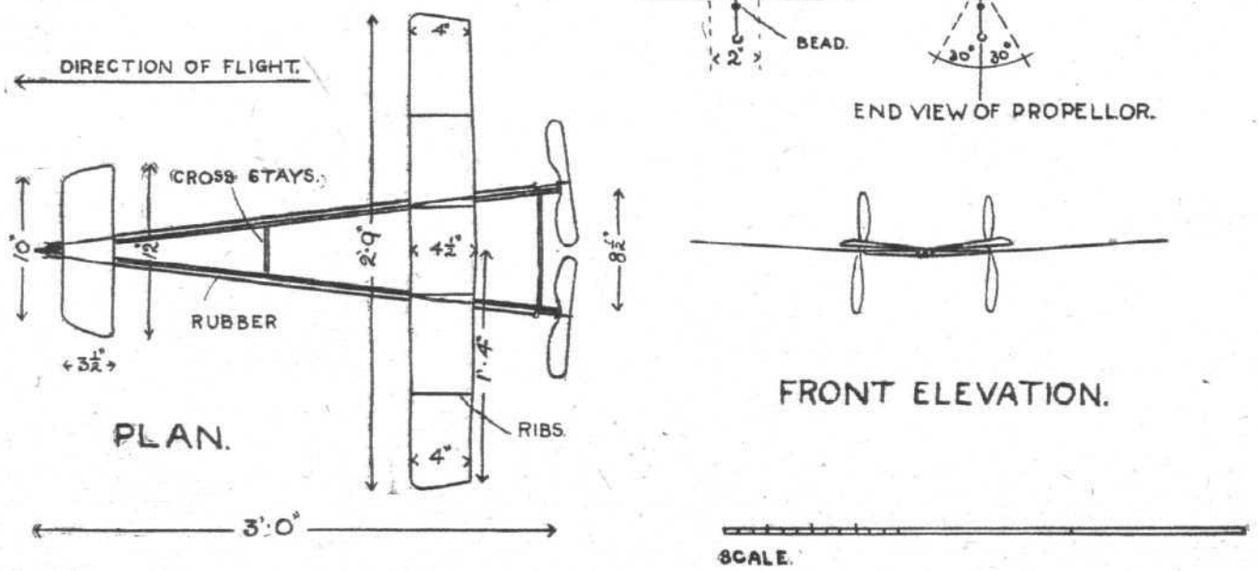
Camaraderie.

It is with great pleasure that we publish the following letter from Mr. George White, of Sandiacre, near Nottingham, for the spirit of camaraderie displayed by Mr. Burchell should be known to all model workers.

Mr. White says: "I first had my attention directed to model aviation during December of 1916, when my two boys had a twin propeller A frame monoplane sent to them as a Christmas present. Although never having had any experience of this kind of thing before, we managed after repeated efforts to put up what was to us a fine flight of perhaps 50 yds. Just a few weeks afterwards I was in town, and noticed on the bookstall a copy of "FLIGHT" which I brought home and eagerly perused. In it I noticed a monthly report of the doings of the Finsbury Park and District Model Aero Club containing an account of the flights of a 4 ft. monoplane built by Mr. Burchell. The, to me, remarkable distance it had flown, filled me with a keen desire to learn something more about it, and although never having tried my hand at this kind of work, I decided I would write the secretary, asking him if he thought Mr. Burchell would supply me with some particulars with a view to my making this model. I received from the Secretary, Mr. Raynor, a most courteous letter promising to place my wishes before Mr. Burchell, and intimating that I should most probably get all the information I required from him. In the course of a few days I received a most prodigious epistle of some fourteen pages containing sketches of all the various parts, together with explanations of the best methods of making the model. I must confess that on learning the delicate nature of the work required I was almost afraid to start, but seeing that Mr. Burchell had been so overwhelmingly kind and had been to a vast amount of trouble—it must have taken him hours to write me the very full description—I felt it was up to me to go through with it. I therefore wrote asking him if he would kindly supply me with a list of the quantities of the whole of the material I should require and where I might purchase same. Instead of sending a list he took the trouble of purchasing and sending to me, a perfect stranger, the whole of the materials I wanted, a kindness I can never fully repay, and I have since built and very successfully flown the model as illustrated in "FLIGHT." My machine complete weighs slightly more than Mr. Burchell's, as I find that eight strands of ¼ in. strip rubber gives me the most successful flights. Up to date her best performance has been 60 secs. with an estimated distance of 500 yds. The large photograph is of the machine completed and the smaller one, which I call "Well Up," of the model in full flight. Both photographs were taken by myself. During a successful flight after the propeller has stopped she glides down gloriously and alights as lightly and gracefully as a bird. I can thoroughly recommend any reader to build this



MR. GEO. WHITE'S MODEL.—On the left the model is seen complete, while the view on the right shows the fine flying qualities of the model.



Drawings of Mr. H. G. Pickering's model monoplane.

machine. Anyone who does so should make a point of purchasing a "Sebur" propeller from A. E. Jones for same. I am now engaged upon a machine similar in design with a 6 ft. braced plane, and if she turns out successful will let you have particulars later of her performances. In conclusion, let me say that "FLIGHT" was the means of introducing me to one of the most fascinating pastimes I have ever engaged in and to one of the best men I have "never" met, for although Mr. Burchell and I have never seen each other—we hope to do so ere long—we are now the firmest of friends and correspond regularly."

A Twin-Pusher Canard.

WITH a view to assisting other model makers, Mr. H. G. Pickering, of 71, Willmore Road, Perry Barr, Birmingham, sends particulars of a model aeroplane he has recently constructed, embodying his own ideas, and which has proved very successful in its trials.

"The model is of the 'V-shaped' kind, and flies with the small plane first, as will be seen from the accom panying scale drawings.

"Silver spruce, $\frac{1}{4}$ in. sq., is used to form the framework, which is 3 ft. long and $8\frac{1}{2}$ ins. wide at the rear. The cross-stays are $\frac{1}{4}$ in. by $\frac{1}{8}$ in. in section, and are $3\frac{1}{4}$ ins. and $7\frac{3}{4}$ ins. long respectively. The large one is $1\frac{1}{2}$ in. from the rear of the machine, and the small one 16 ins. from the nose, and they are bound and gummed on to the main spars.

"Eighteen gauge steel piano wire forms the framework of the planes, dimensions of which can be obtained from the drawings. The joints are made at the rear edge of each plane, and they are bound with thread. The ribs, four in number, have a camber of $\frac{1}{4}$ in., and the ends are bent round and fastened with thread likewise. Solder is not used.

"The planes are then covered with oiled silk. As will be seen, they are slightly V-shaped, and the leading edge of the small one is bent up to give the rise.

It is best to bind the planes on with elastic so that they can easily be moved about to get them in the correct position for flying, but roughly the rear edge of the main plane should be 6 ins. from the end of the machine, and the small plane 2 ins. from the nose. Also a wedge may be used under the small plane to give more lift, if necessary.

"The propellers, of the 'bentwood' type, are composed of satin walnut, $\frac{1}{16}$ in. thick, and the blades are bent at an angle of 30 degrees (see detail), by steaming. They are formed to revolve outwards when flying.

"Piano wire is used for the axles, both ends of which are softened, one to form the hook, the other to go round the propeller, which is bound. It is wise to slip a piece of thin rubber tubing on the hooks to protect the elastic.

"The motive power is six strands of $\frac{1}{4}$ in. strip rubber (A. E. Jones, Ltd.) for each propeller.

"When winding up, each propeller should have 600–700 winds. Length of flight, 200–300 yards.

"Wheels have also been used on this model with good results."

SIDE-WINDS.

IT should be noted that the London offices of the Aircraft Manufacturing Co., Ltd., have now been moved to 27, Buckingham Gate, S.W. 1. The London offices of the Gnome and Le Rhone Engine Co., Ltd., and Airships, Ltd., have also been transferred to 27, Buckingham Gate, S.W. 1.

FROM Messrs. C. A. Vandervell and Co., Acton, W. 3, comes a new edition for December of the C.A.V. moon chart, compiled by Mr. A. H. Midgley, chief engineer of the company. Anyone who would like a copy should drop a line to the firm as above.

ONE of the few firms who previous to the war laid themselves out to supply aeroplane fittings and parts was the Rotax Motor Accessories Co., Ltd., and so when war broke out they were not unprepared to meet the great demand which immediately grew up. For the convenience of aeroplane builders the firm have published a booklet illustrating the A.G.S. and other aircraft fittings which they supply. Although it is not very large, it is a useful publication, and all who have to do with the purchase of such material would do well to secure a copy. All that is necessary is to send a card to the Rotax Company at Victoria Road, Willesden Junction, N.W. 10, Most of the items listed are clearly illustrated, and the prices of the various sizes are set out in table form.

IT is a feather in the cap of the Palmer Tyre, Ltd., that in spite of a considerable amount of opposition the American Society of Automotive Engineers, sitting in Washington, has adopted the Palmer rim and wheel as standard for aeroplanes for military use. This action makes it possible in the event of an accident to either a British or an American machine while landing, to replace immediately a shattered wheel with a standard one. The B. F. Goodrich Rubber Co. is, we understand, the sole licensees of the Palmer tyre in the U.S.A. country, and it was at the suggestion of the Goodrich Co. that the society unanimously accepted the British rim and wheel for recommendation to the Government. The Goodrich Co. has sent to all U.S. wheelwrights and manufacturers copies of the specifications, and received replies assuring co-operation in hastening the construction of the wheel. The Goodrich Co.'s act in distributing plans to the leading wheel and rim makers was warmly commended by the S. A. E., and indicates clearly how strongly the big industrial corporations have placed their resources and ingenuity at the disposal of the U.S. authorities.

FROM Mr. Clarence Winchester, who is so well known in connection with Shoreham and Hendon aerodromes, we learn that he has been appointed to the editorial staff of the *Daily Mail*, with a view to keeping an eye upon all matters relating to flying. Incidentally, we understand that Mr. Winchester has a book of poems coming out shortly, and no doubt some of them will deal with flying.

ONE of the worries which beset aircraft manufacturers is that of transport, and many of them have proved the advantage of having their own facilities. The fact that a number of aircraft firms have selected the Palladium lorry goes to show that it possesses special fitness for this class of work, and those in the Midlands who contemplate either putting a lorry into service, or of increasing their fleet of vehicles should get into touch with Mr. Edward G. Brown, of 5–7, Great Hampton Street, Birmingham, who will be pleased to send particulars of the 4-5 ton lorry, and to arrange for a demonstration run, &c.

The London Aerodrome, Hendon.

BEFORE the War Losses Committee on November 28th the Grahame-White Aviation Company claimed compensation for damage sustained to their aerodrome at Hendon during Admiralty occupation. Mr. Grahame-White said that when the war broke out he was particularly anxious that the Admiralty should utilise his aerodrome. The Admiralty took over a shed and housed a large number of aeroplanes. They were charged £125 a year for the shed—a sum much below the usual figure. Subsequently the officials picked out the best portion of land in the aerodrome, comprising some 800 acres, and took it all over, including the sheds on it. This resulted in a considerable loss to the aerodrome. The Admiralty, in fact, assumed domination over the whole place, stationing sentries outside the gates, prohibiting him from taking pupils, and refusing the public admission. This put an end to his most lucrative business of giving demonstration flying, for which he had received as much as £1,500 in one day. The claim was a very moderate one, for they were only asking for £25 per week. The case was adjourned in order that the Admiralty might be legally represented and to give the Commission an opportunity of inspecting the aerodrome.

PUBLICATIONS RECEIVED.

Industrial Engineering: Present Position and Post-War Outlook. By F. W. Lanchester. London: Constable and Co., Ltd., Price 1s. net.

Steels used in Aero Work. By W. H. Hatfield, D.Sc., A.F.Ae.S. Aeronautical Reprints, No. 1. London: The Aeronautical Society, 7, Albemarle Street, W. Price 5s.

Methods of Measuring Aircraft Performances. By Capt. H. T. Tizard, R.F.C. Aeronautical Reprints, No. 2. London: The Aeronautical Society, 7, Albemarle Street, W. Price 1s. 6d.

The Screw Propeller in Air. By M. A. S. Riach, A.F.Ae.S. Aeronautical Reprints, No. 3. London: The Aeronautical Society, 7, Albemarle Street, W. Price 2s. 6d.

Catalogue.

Gamage's Xmas Bazaar: 1917. A. W. Gamage, Ltd., Holborn, E.C.

COMPANY MATTERS.

Sunbeam Motor Car Co., Ltd.

AT the general meeting of the Sunbeam Motor Car Company, Ltd., Mr. Thomas Cureton (Deputy Chairman) presided, in the absence through indisposition of the Chairman (Mr. John Marston, J.P.).

The Chairman having paid a tribute to Mr. Marston, said, for the second year in succession, they had been unable to square the accounts with the Ministry of Munitions and the Inland Revenue authorities. Progress had been made and it was felt that matters were well on a way to settlement. In comparison to twelve months ago the rate of dividend paid this year had been reduced. It was felt that this course was advisable in face of the wholly exceptional circumstances under which controlled establishments work to-day; in fact, it was a measure of precaution. There had been no reduction of output from the Sunbeam works during the financial year, but war work under the control of a wide variety of Government departments, with each of which the company's relations were amicable, was, nevertheless, and quite unavoidably, increasingly complicated because, unhappily, it remained a fact that we suffered from an absence of co-ordination between the various departments, with which they were concerned under different heads. The company's extra output of essential munitions of war involved the employment of much greater capital. That would be so even in peace time conditions, but for several reasons it was emphasised in war time.

In the first place, costs were going up against the company all the time, as would be gathered from the succession of Government awards, by way of increases in wages to members of the engineering trade. There had been two during the financial year, and the largest was only last month. It was not known when or where this process would end, and the increase in wages in the year received represented an extra cost to the company of more than £60,000 per annum in wages alone.

It was necessary for the directors to be extremely cautious in regard to their financial policy at this juncture, particularly as any further increase of output would probably involve the extension of premises and plant.

On reviewing the firm's financial history it would be found that they had received an average dividend of 20 per cent. Therefore the dividend which they now recommended should be paid in respect of the working year which ended August 31st was an average one, and one of which any industrial concern might be proud.

Mr. Louis Coatalen, Chief Engineer and Joint Managing Director, stated that the policy of the company in regard to producing such munitions of war as aircraft engines and so forth was that of the military command—namely, to be perpetually on the offensive and never to rest on their laurels. That policy had been continued and the maintained success of it more than justified it. To-day they were being produced under license, not merely widely in this country, but on the Continent of Europe and in Canada and the United States of America. That was a position quite unique so far as their knowledge of British motor engineering went.

Another branch had also been added to their business, possessing notable possibilities. He could assure the meeting that this experimental work had been continued ceaselessly and with a measure of success which he should scarcely have dared to foretell about a year ago, nor was the utility of the products they evolved confined to the aerial arm.

Mr. W. M. Iliff (joint managing director) supported the resolution, and said it was hoped to present the balance sheet at an early date. The negotiations with the authorities over matters of finance must of necessity be carried through carefully, and not hastily. Practically 100 per cent. more stocks was now carried than in the year 1915, when the accounts were last published. Having commended the staff, and mentioned the appointment of Mr. Mortimer as secretary, Mr. Iliff assured the shareholders that everything had been and would be done to ensure the safety and the prosperity of the concern as a whole.

The report was adopted unanimously.

Messrs. E. Deanesly, M.D., and W. M. Iliff were reappointed directors.

NEW COMPANIES REGISTERED.

CHISWICK AVIATION WORKS, LTD.—Capital £1,000, in £1 shares. First directors: J. Dockx and L. Pauwels.

CLAYLANE ENGINEERING CO., LTD.—Capital £2,000, in £1 shares. General and aeronautical engineers, &c. First directors: H. E. Longini and A. Huart.

EDGWARE ENGINEERING AND AIRCRAFT CO., LTD.—Capital £100, in £1 shares. Mechanical and general engineers, manufacturers of and dealers in aircraft, &c.

ELDON AVIATION CO., LTD., 46, Eastcheap Buildings, E.C. 3.—Capital £5,250, in 5,000 preference shares of £1 each and 5,000 ordinary shares of 1s. each. First directors: A. X. Stavrulopulo and C. H. Fieldsted.

ENGINEERING AND AIRCRAFT CONSTRUCTION CO., LTD.—Capital £5,000, in £1 shares. First directors: I. T. Bell and A. Haslam.

FORNCETT ENGINEERING CO., LTD., Queen Street Chambers, 66, Queen Street, Sheffield.—Capital £2,000, in £1 shares. Acquiring business carried on by J. Picken and J. Britland, as the Forncett Garage and Engineering Co., at Forncett Street, Sheffield, as general engineers and tool makers and also the machinery and tools of that part of the business of Charles Rawson and Co., Ltd., carried on at the back of 511, Staniforth Road, Darnall, Sheffield, as general engineers, also to carry on the business of manufacturers of and dealers in aeroplanes and aerial machines, &c. First directors: J. Picken, J. Britland, H. C. Rawson, A. Randall and A. Adkin.

HOLLOW STRUCTURE AND AIRCRAFT CO., LTD., 4, Old Burlington Street, W.—Capital £55,000 in 25,000 participating preference shares of £1 each, and 60,000 ordinary shares of 10s. each.

JACKSON AIRCRAFT CO., LTD., 215, Mare Street, Hackney, N.E.—Capital £10,000, in £1 shares (7,500 preference). First directors: A. H. Botwright, A. Jackson and C. O. Jacobs.

ORB MARINE INSURANCE CO., LTD.—Capital £500, in £1 shares. Marine insurance agents, brokers and underwriters, &c. Power is also taken to negotiate and effect (directly or indirectly) insurance on aerial conveyances.

RUSTLESS IRON (COWPER-COLES PROCESS), LTD.—Capital £5,500, in 5,000 7½ per cent. cum. pref. shares of £1 each and 10,000 ordinary shares of 1s. each.

THE SHAREHOLDERS' AIRCRAFT SYNDICATE, LTD., 20, Northampton Park, Canonbury, N. 1.—Capital £1,000, in 3,600 "A" shares of 5s. each and 24,000 "B" shares of one penny each. The objects are: "To organise, develop and work aeroplane businesses, to enforce, as far as may be, the performance of contracts for the sale or purchase or otherwise of French and British patents, works, businesses and goodwill relating to aircraft, to deal in the share rights of the shareholders of the Blériot Manufacturing Aircraft Co., Ltd."

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Aeronautical Patents Published.

Applied for in 1916.

The numbers in brackets are those under which the specifications are printed and abridged, &c.

Published November 22nd, 1917.

15,170. H. STUBBS. Stop-gear for twin engines on aeroplanes. (110,588.)
15,401. AERONAUTICAL INSTRUMENT CO. AND G. BREWER. Aneroids, air-speed indicators, &c. (101,614.)
15,753. C. W. KENNEDY AND W. JACKSON. Clinometers. (110,623.)

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15,616. SOPWITH AVIATION CO. and T. SOPWITH. Device for attachment of cables, wires, &c., upon aircraft. (110,795.)
15,623. GWYNNES, LTD., and H. HUMPHREYS. Means for attaching ignition wires to sparking plugs of rotary aeroplane engines. (110,796.)
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17598. H. W. PUGH and C. H. VIDAL. Device for testing pitch of a screw. (110,976.)

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